Chemical Age

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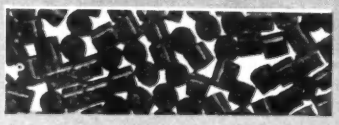

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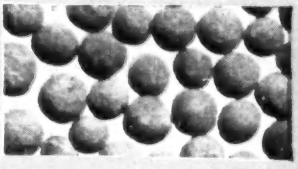

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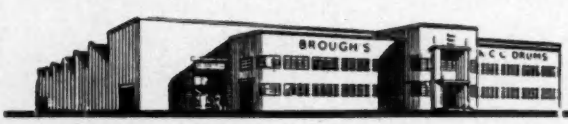

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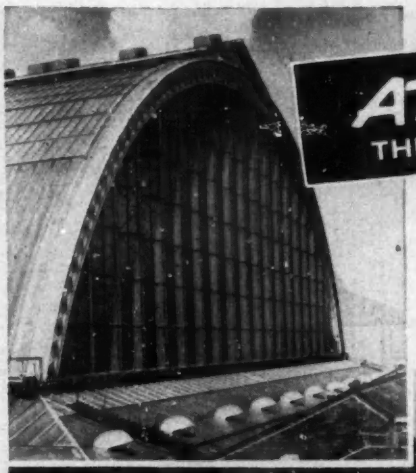

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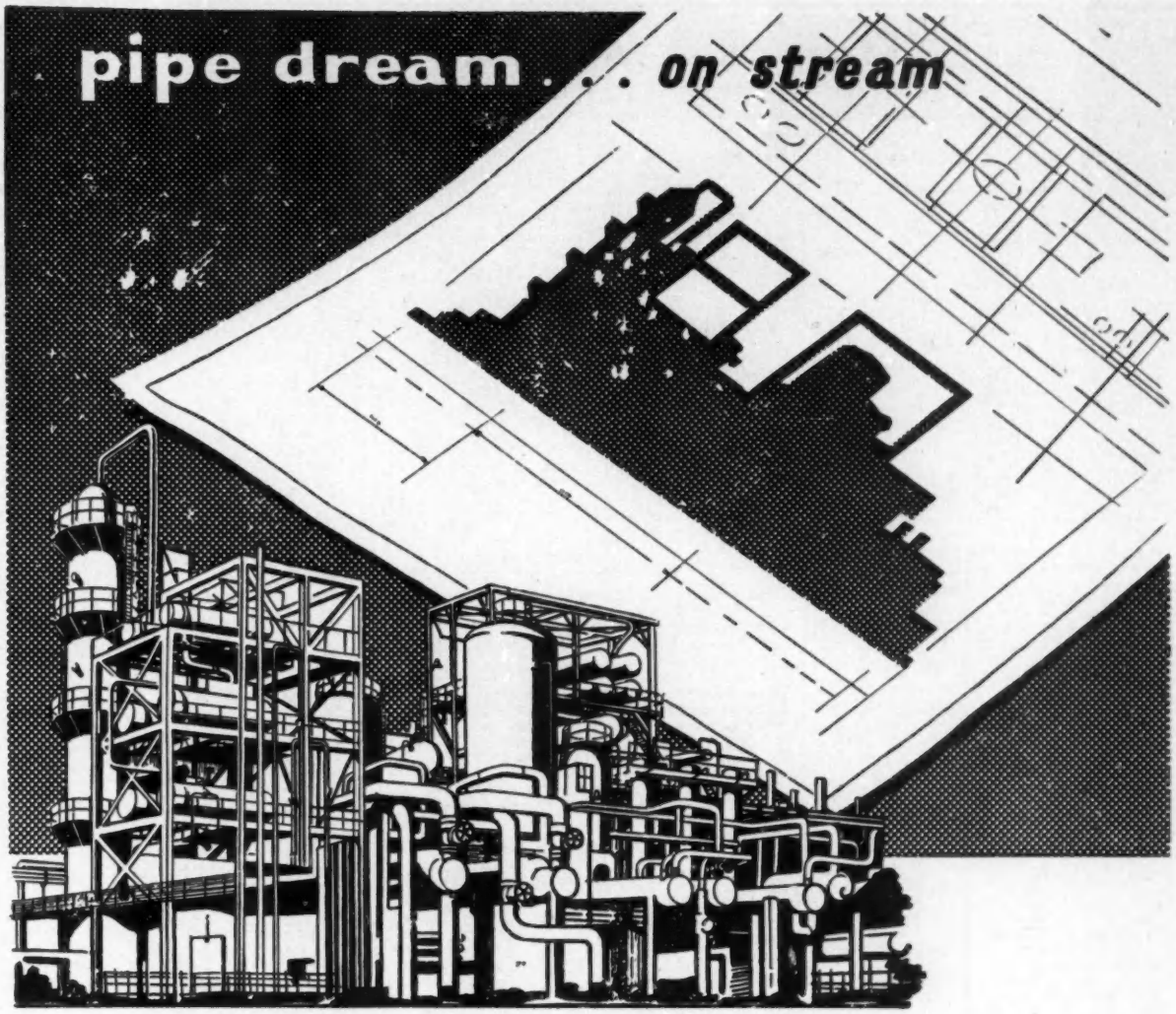

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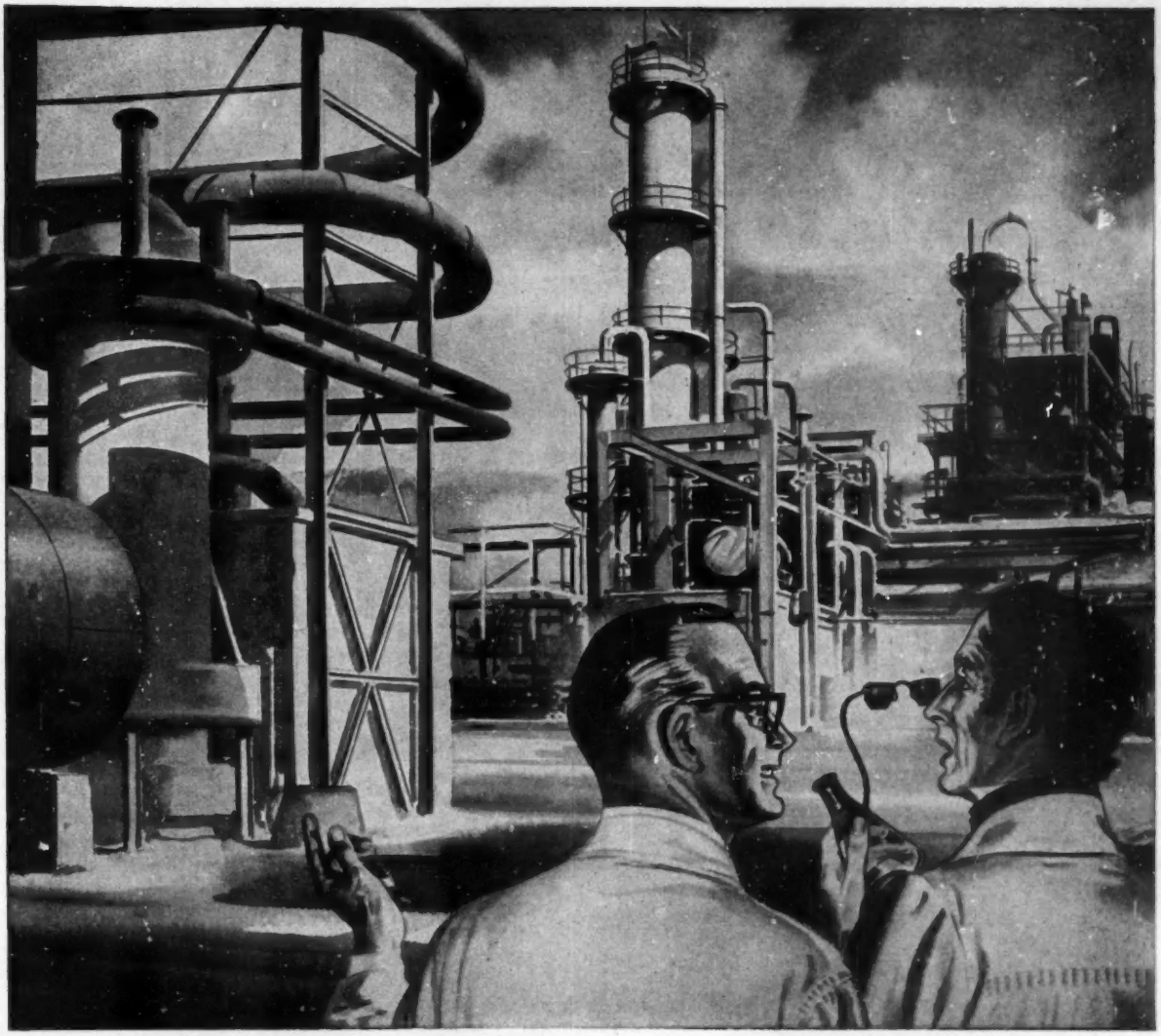

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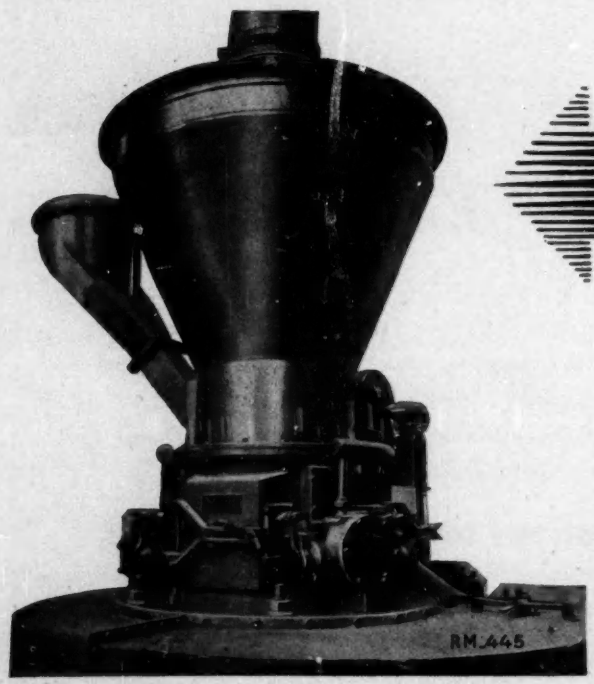

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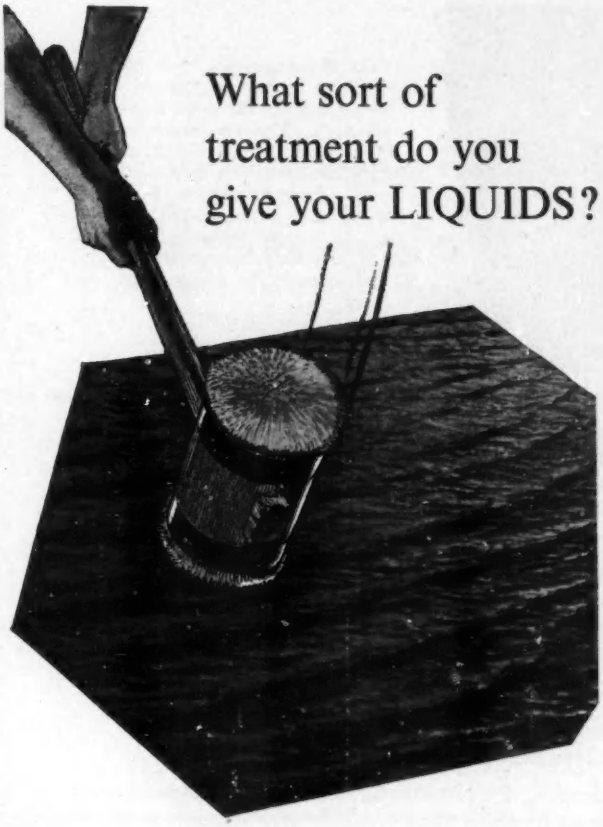

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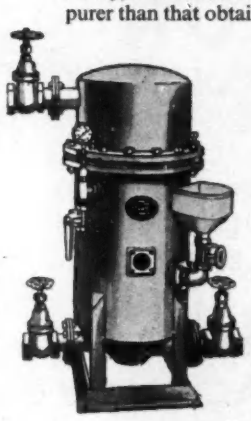

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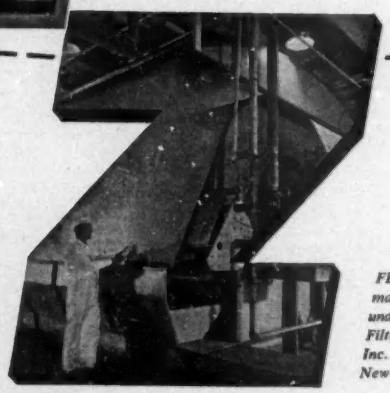

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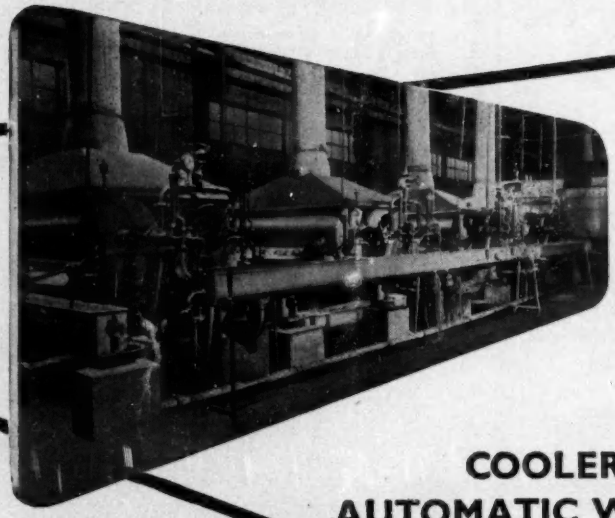

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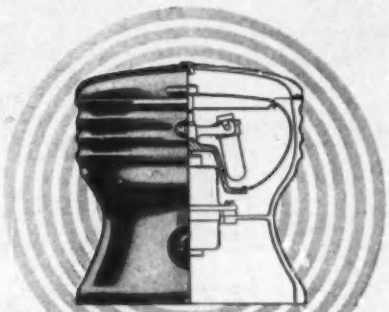

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CHEMICAL AGE

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COAL GASIFICATION

UNDERGROUND gasification of coal, a process for bringing to the surface as gas the useful ingredients of coal, while leaving unwanted material such as ash behind in the seam, is not a new idea. In 1868 Sir William Siemens, and some 20 years later Mendeleev, referred to the possibilities of such a process, but first experiments were carried out only in 1912-13 by Sir William Ramsay.

For a proper assessment of the value of underground gasification it is necessary to carry the experiments outside the laboratory. Field trials were begun by Russia in 1931, and latterly these have been on a large scale. A lignite deposit is now being gasified on a commercial scale. In fact, Russia has a substantial technical organisation. Also, it is known that (see P. 852) progress has been made with the use of oxygen, which offers the possibility of producing gas of a higher calorific value than can be obtained by using air and one that might prove suitable for use in town gas or for syntheses.

With air enriched to 70 per cent oxygen on processes, underground gas of the following composition was obtained: CO_2 (20), O_2 (0.2), CO (28), H_2 (30), CH_4 (10), N_2 (11.8) and calorific value of 286.

This country has considerable reserves of poor quality coal, unsuitable for mining because of its high ash content. Since 1950 some 50 trials have been conducted by the Ministry of Power at two different sites, each with different seam conditions. The sites were at Newman Spinney, near Chesterfield, and near Bayton, Worcestershire. Over 5,000 tons of coal were gasified at an experimental cost of over £¼ million. Last year the National Coal Board accepted responsibility for underground gasification trials and the Central Electricity Board agreed to convert the gas into electricity.

Progress at the pilot plant prepared at Newman Spinney is reported in P. 843. Newman Spinney coal is of the mildly-coking type, and the plant is to be in operation next year, and should be able to produce sufficient gas to generate 5 MW continuously for several years. The plant is about one-tenth the size of a minimum commercial system. The purpose of the plant is two-fold. It will demonstrate the process and give an indication of probable costs and it should provide the necessary evidence and technical 'know-how' to provide the basis for a commercial system.

The main use for gas produced by air of calorific value under 100 B.Th.U. per cu. ft. is for on-site generation of electricity, when one of three plants may be used. Gas engines and gas turbines are doubtful, as both involve additional cleaning of the gas from dust and tarry matter. At present a boiler plant with a turbo-generator is to be used.

Investigations will involve examination of combustibility in relation to the design of burners and combustion chambers. Dehydration may be required because of the moisture content of the gas which acts as a diluent in regard to calorific value.

Therefore the comparatively small cost of these trials should assist considerably the assessment of the economic potential. Throughout all trials to date, probable commercial costs have been borne in mind. The criterion is, of course, the cost of coal delivered to power stations. In the last seven

years this has risen from 54s a ton (2¼d per therm) to nearly £4 a ton (4d per therm). There are indications that underground gasification may give a gas cost equivalent to coal at £2 a ton or less. Certainly the long-term aspects are to relieve pressure on coal and oil supplies and to reduce fuel imports which are now costing over 6d per therm.

The present process is limited to supplying low-grade gas to power stations erected on site. However, it is believed that if oxygen is used a higher grade gas can be produced, the cost of which may make it economical for transmission and for other purposes such as synthesising oil, etc.

Another project also likely to have far-reaching results for the gas industry is the North Thames Gas Board's new installations which will soon be preparing refinery gas—as distinct from coal gas—for public use. This project is designed to reduce the gas industry's dependence on coal and allow an increase in production at lower costs than is possible using traditional methods of gas generation. The rich refinery gas will be diluted to a calorific value suitable for commercial use and will be fed into the Board's existing distribution system.

It is learned that Shell Refining Co. will supply 25 million therms a year (about 14 million cu. ft. of gas a day) of refinery gas for a period of 10 years. This is equivalent to gas produced from 250,000 tons of carbonisation coals a year and will form about 6 per cent of the Board's total production. Initially the load through the pipeline will be four million cu. ft. of rich gas a day, but the potential capacity is 10 million cu. ft. an hour.

Underground gasification and utilisation of by-products of refinery processes are now very much to the fore, having regard to the mounting cost of mining and importing suitable coals. In terms of calories, oil extraction is estimated to cost less than one-third and natural gas extraction only one-twelfth of coal production.

PUBLICITY REAPPRAISAL NEEDED

TWO fundamental problems facing the chemical industry, although completely dissimilar, both call for a policy of greater publicity and dissemination of information. They are the current shortage of scientists and technologists and the projected European free trade area. To some extent, as yet unpredictable, the shortage of scientific personnel is likely to become more acute under the highly competitive conditions of free trade.

Although it cannot be said that a more intelligent use of publicity is likely to solve the difficulties of either situation, there is no doubt that a greater level of activity in the promotion of science and the UK chemical industry would have lasting benefits. The power of publicity in this respect should not be underestimated.

Each of these two problems calls for expansionist policies. Britain needs more scientists and technologists and needs them quickly; the chemical industry must plan for still greater expansion if it is to take full advantage of the free trade project. Chemical manufacturers have a profound interest in finding satisfactory solutions to each.

How can publicity help? In the case of the shortage of trained men and women, it can help overcome the prejudice that still lingers in favour of the humanities; it can attract suitable recruits to science by recounting the many British scientific achievements that stem continuously from research institutions and industrial research. Each year countless advances and discoveries, most of them unspectacular in themselves, go unheralded. Because many of them are often reported in papers that are not published, they may even be unnoticed by scientists working in the same field.

In the chemical industry, manufacturers are generally shy of publicity. Modesty, however, has no virtue in industry. Faced with the threat of greater competition, the UK industry should be telling the world of its achievements, its great expansion projects, and perhaps even more important, its vital contribution to everyday life.

Those manufacturers who believe that the possibility of a free trade area calls for an even greater veil of secrecy over their operations are greatly mistaken. We are not disputing the need for silence where certain processes and techniques are concerned, although that is usually carried too far; even when that is taken into account there is still scope for a vast increase in the amount, type and quality of information that is disseminated.

The various professional societies and trade associations should also be reconsidering their approach to publicity. The many papers presented at meetings of the Society of Chemical Industry, the Royal Institute of Chemistry, the Chemical Society, and the Society for Analytical Chemistry, to name only a few sources, contain much information of a general news value that needs only the correct type of assessment to see that it appears in the right journals and newspapers.

If that were done, it would do much to attract attention to scientific achievement and to demonstrate the fact that chemistry offers a worthwhile career. Such a policy would, in fact, go some way to implement the praiseworthy plea recently made by Prince Philip for everyone to have some knowledge of science.

There is much that the Association of British Chemical Manufacturers and other trade associations could do to publicise the chemical industry as a career; they should also be considering their approach to the European free trade area from a publicity standpoint.

A positive lead is called for from the societies and associations if the lack of scientists and technologists is to be made good and if the UK industry is to place itself on the most competitive footing.

CANADIAN TRADE MISSION

THIS week has seen the arrival of a very large Canadian trade mission whose main interests are in increasing purchases from Britain. The mission is composed of prominent Canadian businessmen and officials and is to make an extensive tour of British industry.

The possibility of expanding purchase of capital equipment from the UK rather than consumer goods appears to be the major interest of the mission, for Canadian business is as interested as the Canadian Government in seeing that their adverse trade balance with the US—some $1,003 million for the first six months of this year—is reduced. An increase in UK dollar earnings would, Canada hopes, lead to an increase of UK purchases in Canada, which at present are almost entirely confined to essential raw materials.

It is not considered, as the situation exists at present, that the sale of British consumer goods can be greatly increased. In fact, it is emphasised that any increase in UK exports to Canada must not be achieved at the expense of the Canadian manufacturer.

The present difficulties associated with selling in the Canadian market are unlikely to be quickly or easily resolved particularly as regards the British chemical industry. UK exporters have, since the war years, had to face the heavy competition from US manufacturers. Also, the US has the significant advantage of being on Canada's 'doorstep' so that today a high proportion of capital development is controlled by US organisations. Canadian tariffs, too, favour the US.

In the past Canada has criticised British manufacturers on design, delivery dates and after-sales service. It is to be hoped therefore that the various problems associated with trade between this country and Canada can be discussed and overcome and so result in the UK gaining a greater share of the Canadian market.

BRITISH CONTRIBUTION TO SUGAR RESEARCH

Report of U.S. Foundation

DETAILS of sugar research projects in Great Britain are given in the report presented by Dr. John L. Hickson to the Sugar Research Foundation, Inc. In April this year Dr. Hickson, a director of the Foundation, carried out a European tour.

During a visit to the research laboratories of Tate and Lyle Ltd., at Ravensbourne, Dr. Hickson discussed the Foundation's proposed project on a method of determining moisture in granulated sugar with Mr. S. Hill. Mr. Hill has been using vapour pressure methods to find out how much and in what ways moisture is held on or in the sugar granules. His determinations are suggested as being quite valuable in laying the groundwork for the Kendall project.

Seven sucrochemical projects are under way. Projects 125, 126 and 127 are being studied by Professor E. J. Bourne at Royal Holloway College, London. Project 125 is concerned with the effects of sucrose esters as bread softeners. Bourne's tests of antistaling effectiveness involves determining the percentage of starch rendered insoluble by the agent under controlled conditions. In one test a sucrose monostearate sample precipitated 71 per cent. of the starch in contrast to polyoxyethylene stearate and polyoxyethylene sorbitan which precipitated 65 per cent. Glyceryl monostearate, now used in the baking industry, precipitated only 34 per cent.

Carboxiakyl Sucroses

Regarding Project 126 Professor Bourne has begun a study of the structure of the carboxyakyl sucroses which appear to be useful for chelating metals. Sucrates prepared in liquid ammonia would not react with methyl iodide. A similar reaction product prepared in dimethylsulfoxide appeared to be hydrolysed by residual water in the solvent. A method involving scrupulously anhydrous conditions was devised which yielded methylated sucrose. A monosodium sucrate appeared to react with methyl bromoacetate, the products of which are being separated chromatographically.

In the third project, No. 127, possible compounds formed by reacting acetaldehyde, formaldehyde and sugar in alkaline solution are being studied.

Professor A. G. Foster, who is in Professor Bourne's department, is engaged on the Foundation's new project, No. 142. He is making an intensive study into the effect of sugar substitutes on the fugacities of flavour substances.

Sondes Place Research Institute has undertaken the study of reductive aminolysis under Dr. H. H. Chambers—Project 131 (£7,215). Three varieties of Raney Nickel catalysts have been tried in a laboratory-size reactor to determine which was the most suitable for pilot plant studies. It has been found that the catalyst could be reduced to half (to 10 per cent of the sugar) without significant sacrifice in rate of hydrogen uptake. This permits considerable economy in pilot plant operations.

Vapour phase chromatography has made it possible to identify the following substances in the reaction product: ethylene diamine, propylene diamine, cis-2,5-dimethylpiperazine, trans-2,5-dimeethylpiperazine, 2-methylpiperazine and piperazine. So far, organic components in the low boiling fraction have resisted identification by this means. Ethanol and propanol amines are expected in higher boiling fractions, but there are no techniques for identification.

As fractional distillation of the reaction mixture has proved a relatively inefficient procedure for separating the components, more effective procedures are being sought.

Dr. L. Hough at the University of Bristol, who is on Project No. 121 (bridged sugar derivatives) is attempting to introduce a non-hydrolysable bridge between the glucose and fructose moieties.

Fused zinc chloride and anhydrous cupric sulphate, reputed to be catalysts for cyclic acetal formation, have been found not to cause condensations of aldehydes and sugar in dimethylformamide or dimethylsulphoxide.

Sucrose and ethylchloroformate in water reacted at 0°C when sodium hydroxide was added dropwise, to give over 70 per cent yields of a product, which is presumed to be an octaester. The ester is stable for an hour to hydrolysis in 5-N HCl at room temperature, but hydrolyses rapidly under the same conditions after a brief exposure to alkali. This result is considered to be quite encouraging, for it suggests that a new technique for preparing sucroses esters is at hand.

Sucrose has also been reacted with ethylene sulphate (prepared by reacting ethylene dibromide and silver sulphate) in alkaline solution. The product is now under examination.

At the Arthur D. Little Research Institute, Project No. 132 on the reaction between sodium and sugars is being dealt with by Dr. W. Black. £18,000 has been allocated for this project. Sodium reacts with sucrose in pyridine and morpholine but yields a product corresponding to adducts of sucrose and sodium hydroxide containing appreciable amounts of solvent. N-Methylpyrrolidone and dimethylsulphoxide react with sodium. N,N.-Diethyl- and N,N-dimethylaniline prove to be very poor solvents for sucrose.

Ammonia was found to give true sucrates containing one to five atoms of sodium but considerable care was required to maintain anhydrous conditions to prevent formation of NaOH adducts.

Future work will include reacting true sodium sucrate with : methyl iodide, ethyl chloride, ethylene dichloride, bischloromethyl sulphide, bischloromethyl ther and a variety of other chlorine derivatives.

Mr. P. G. Isaac of the Civil Engineering Department of King's College, University of Durham, Newcastle, has started on project No. 134, which is to discover how well sewage organisms remove the sucrose esters from sewage.

Fluid Beds for Drying Latex-Dipped Yarn

ANNUAL report for 1956-57 of the director of research, British Rayon Research Association, states that the use of fluid beds for drying latex-dipped yarn has been explored and found to be feasible. A 50-end machine is now under construction by a manufacturer for sale to a customer. Full-scale fluid bed machines have also been built by a plant manufacturer for the drying of fabric treated on one side with latex.

A manufacturer-user licence has been granted by the council to a member firm for the construction of a fluid bed machine for the heat setting of nylon. Other member firms are exploring the application of fluid beds to find a solution to their own particular problems.

Considerable progress has been made in the design and use of fluid beds for the dyeing of nylon, triacetate and Terylene, using azoic dyes, acetate dyes and Procion dyes.

Du Pont Synthetic Rubber Plant

Work is to start within two months on the first plant by Du Pont de Nemours in Europe. A staff of 400 will produce synthetic rubber at Maydown near Londonderry in Northern Ireland. The plant is expected to be completed by 1960.

Italian Chemists to meet Jointly with SCI

NEXT year the national congress of the Societa Chimica Italiana will be held jointly with the Society of Chemical Industry in Turin from 25 to 31 May. There will be three days of business sessions alternating with three days of visits to chemical organisations.

During the morning sessions, lectures will be given by prominent British and Italian scientists, including Sir John Cockcroft, Sir Robert Robinson, Sir Alexander Todd, Sir William Ogg, Professors Natta, Nasini, Daniel Bovet and Semerano.

The registration fee is 10,000 lire (approx. £5), and this will entitle congress members to participate with no additional payment in all events, including visits, meals, receptions and congress banquet.

Water Authorities Concern over Radioactive Pollution

According to a report of the Executive Committee of the British Waterworks Association presented at a meeting of the association on Thursday, water authorities are increasingly concerned over the possible contamination of water supplies by radioactive substances from atomic power stations. The executive are therefore considering setting up a special sub-committee to examine the technical implications.

★ THE shutdown of ICI's Ardil plant is seen by Dr. A. Caress, fibres division chairman, as a sobering reminder that not every scientific discovery can be translated into a commercial success even if research effort is lavished on it. Dr. Caress gave this view in the November issue of the *ICI Magazine*.

He said, 'The protein fibres, which is the class of fibre Ardil belongs to, have shown some unexpected limitations now that a good deal of research has been done on them. The main fault of Ardil itself, which was intended for a large-scale, low-priced substitute for wool, is its low strength—and, what is even more serious, its loss of strength when wetted.'

Those properties were gradually improved over the years and so ICI were encouraged to press on with the project. A way was then found of improving even more the fibre's strength and durability. It was decided to give the new variety, Ardil M, a run for its money. But prolonged trials proved disappointing, for there was not enough difference between Ardil M and its forerunner to convert a loss into a profit.

Ardil is in fact still technically successful when blended with cotton and viscose. It was advertised and sold for those applications but sales in those markets alone were not big enough to cover rising costs of manufacture and raw materials.

★ 'EYE ON RESEARCH' is the title of a commendable new weekly series of 10 BBC TV programmes, the first of which was screened on Thursday this week. Aim of the BBC is to take the cameras to see the scientist at work in his laboratory and to cover a representative selection of his work.

The first programme dealt with the Royal Aircraft Establishment wind-tunnels at Bedford. It showed how with models the aerodynamicist predicts the flight behaviour of modern supersonic aircraft. In the second programme, the only one to be transmitted from a studio, Professor C. H. Waddington, Edinburgh University Institute of Animal Genetics, will talk about heredity. He will describe the processes by which the cell perpetuates its characteristics.

In the following weeks TV cameras will visit the Motor Industry Research Association at Lindley, near Nuneaton; the Burden Neurological Institute, laboratories of the Department of Scientific and Industrial Research, the Atomic Energy Research Establishment at Harwell, and Cambridge University.

★ WHAT chemist has never been afflicted by the reaction previously carried out successfully which simply refuses to work at all? There are all kinds of distractions, a call from the managing director, the wrong shape of flask, a disconcertingly watchful eye from the person on the next bench, or weather that is too dry or too wet.

This theme is the subject of an unusual competition for chemists that is announced in the November *Laboratory Bulletin* of May and Baker. One of the firm's young laboratory workers so afflicted once composed a 'Ballade of Chemical Desolation' to mark the occasion. Unfortunately only the envoi has been preserved:

'Prince, I implore you, let the heavens fall,
Let glaciers melt, let workers lose their pay;
Reserve your magic for my anguished call—
This damned reaction will not work today.'

Competitors are asked not to complete the ballade, but merely to supply the first stanza. A first prize of £5 5s and consolation prizes are offered. Entries should reach the competition editor, *M & B Laboratory Bulletin*, Dagenham, Essex, by 31 March.

★ THE chemical industry's place in the UK economy is referred to in Barclays Bank *Review* for November. In 1956, chemical production, valued at £546 million, accounted for 6 per cent of the total value of industrial production of £9,100 million. Based on 1938 = 100, chemical production in 1956 reached an index of 330 compared with 318 in 1956, 298 in 1955, 240 in 1951 and 175 in 1948.

This represents the most striking expansion in British output since before the war and includes, of course, the new petrochemical industry which has grown up from virtually nothing. The value of chemical output, however, is only about one-third the net output of the metal-using industries.

The average yearly increase in the period 1948-1956 in the chemical industry is given as 8 per cent, the highest of any industry; the increase in the first half of 1957 compared with the first half of 1956 is 6 per cent, or 1 per cent behind drink and tobacco, which led the field in this period.

★ 'ENERGY AND MAN' is the broad title given to a special issue of *Esso Magazine*. This is a unique publication containing the opinions of the highest authorities in their individual spheres on the subject of energy from its very beginning in the first primaeval mass to the latest technological advances in man's efforts to control and make use of the many sources of energy.

This special issue commands wide attention for there is no doubt that it makes a valuable contribution to a greater understanding of man's requirements if standards of living are to be raised by an increasing supply of energy from all sources.

Sir Harold Hartley makes the first contribution with an article on 'What is energy?' This is followed by 'Energy in the universe', by Professor C. Payne-Gaposchkin, Harvard University; 'Basic sources of the earth's energy', by Professor A. R. Ubbelohde; 'Solar radiation and life', by Professor A. Dauvillier, College de France; 'Our practical sources of energy', by a Dr. Albert Parker; and 'The energy partnership', including articles on coal, hydro-electricity, oil, solar energy and atomic power.

The article on coal suggests that coal of secondary quality should be made greater use of in the UK, in gasification and in the chemical industry. Such a step would certainly contribute to the economic well-being of the chemical industry.

★ THE 300 guests who attended the 1957 conversazione of the food group, Society of Chemical Industry held on 13 November had the opportunity of inspecting the fine kitchens of ICI Ltd., which were completely re-equipped in 1951. These kitchens provide lunches each day for about 1,000 employees. The visitors learned that despite the size of Imperial Chemical House, it can house less than half of the company's 2,700 head office staff.

The reception was held in the eighth floor refectory where Mr. C. M. Wright, ICI commercial director, and Dr. J. R. Nicholls, food group chairman, and Mrs. Nicholls received members and guests.

As part of the programme, there were three showings of the colour film taken of the group's tour of Switzerland earlier this year. The film was mostly of a social nature because many of the chemical and food firms visited would not allow cameras inside their plants.

★ THE move this month of British Petroleum's geophysical and petroleum engineering research station from Kirklington Hall, near Nottingham, to a new specially built laboratory block at Sunbury-on-Thames concentrates the great majority of BP research at Sunbury. The company's palaeontological laboratory has also recently been moved to the new building from London.

The new laboratory block, built as part of a current expansion programme at Sunbury, is a two-storey building with a floor area of 30,000 sq. ft. It incorporates much modern equipment and stands on the site of Meadhurst, the house purchased by BP in 1917 as its first research laboratory. Kirklington Hall, occupied by the company since 1947, is to be closed.

Alembic

UNDERGROUND COAL GASIFICATION

Progress at Newman Spinney Site

PREPARATION of a pilot plant for the underground gasification of coal at Newman Spinney, near Chesterfield, is well under way and the plant is due to start producing gas by December 1958. The original site of about 23 acres was taken over from the National Coal Board by Humphreys and Glasgow Ltd., the main contractors responsible for the engineering and scientific work, on 1 March this year. A further 50 acres were recently acquired by the NCB for the construction of the first five arrays of the pilot scale plant.

Humphreys and Glasgow are charged with the construction of the pilot plant up to the gas inlet to the Central Electricity Authority power station; the further experimental and development work required; and the preparation of designs for a 60 MW commercial scale gasification plant.

The pilot scheme aims to provide gas for a 3,750 kW generating station which is to be constructed. Work also continues on the site to perfect the technique, to devise the best equipment and to choose the most suitable materials for use. The gas from the pilot plant will be burned in the CEA's boiler house for the generation of electricity by a conventional steam turbine and alternator.

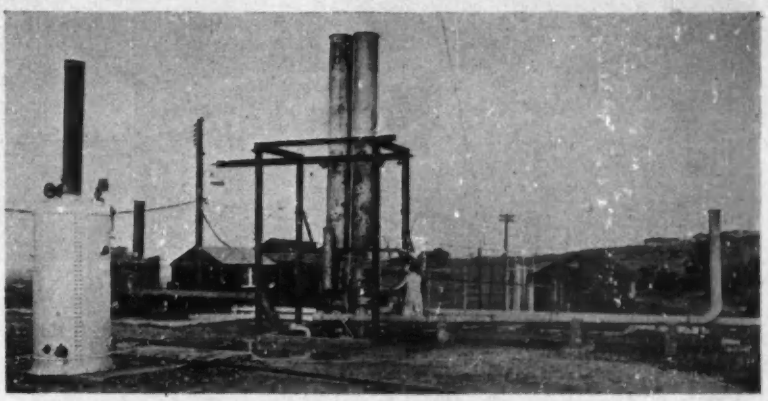
First Pilot Arrays

The positions of the first five pilot plant arrays have been fixed, preliminary surface works have been undertaken and the first shafts have been sunk. To avoid restricting this work at Newman Spinney, the NCB have provided facilities at nearby Oxcroft colliery for experimental work on directed drilling.

Each of the arrays will have a concrete-lined shaft 8 ft. in diameter going down to the selected seam. From the shaft a 100-yard long gallery will be driven into the coal seam and from either side of the gallery boreholes 100 yards long will be drilled in the seam at 10-yard intervals. The gallery will embrace an area of about 20,000 square yards of coal seam.

Tubes fed by blast mains running down the shafts and gallery will feed air from a central blowing plant adjacent to the power station to the far end of each borehole. Gas will return along the boreholes and will be cooled by water spraying in the gallery and shaft, the top of the shaft being capped with a gas offtake connected by surface gas mains to the power station boiler house.

Two such arrays will be gasified together, each having a life of about nine months. While two arrays are being gasified, other arrays will be in course of preparation, so that they can be brought into use without delay when previous arrays are expended.



Experimental shaft No. 1, single borehole trial. Picture shows gas stacks and contractors huts at shaft top

So far all experiments have been conducted with single boreholes. But final preparations are now being made for the first multiple borehole experiment which has been prepared in shaft No. 3 on the experimental site. Four boreholes, each 250 ft. by 12½ in. bore, have been prepared. The air pipes to be used will be 4 in. in diameter made up of short lengths of high chrome cast iron with screwed couplings, with an improved form of joint. The 70-ft. inbye, the tip or forward end, of each air pipe is protected by refractory piping to withstand the high radiant temperatures to which the air pipe is exposed in the early stages of reaction.

The gallery and shaft will for the first time be used to conduct the gas in this experiment and water spraying has been arranged in both the shaft and gallery to cool the gas to 35°C at the shaft head.

The trial run which took place in shaft No. 1 was a single blind borehole experiment, the borehole being 178 ft. long with high chrome iron pipe 2¾ in. bore with the 70-ft. inbye protected by refractory pipes. This trial was ignited on 2 July and was primarily designed as a test of the high chrome iron as a suitable air pipe material.

Instrument hut at Experimental shaft No. 1

A severe leak developed in the pipe on 4 November. To establish the spread of the reaction underground and the reactions taking place at particular points, a pattern of vertical boreholes has been prepared down to seam level through which readings of temperatures and pressure together with gas samples can be obtained.

An experiment in shaft 2 with a mild steel air tube protected throughout with refractory piping was concluded earlier this year. Vertical drilling showed that the experiment which had run for some five months could probably have been carried on for as long again. Horizontal drilling is now being carried out in shaft 2 in preparation for a further series of experiments with different types of air tube materials.

The aim of this work is to establish a suitable air pipe material which, while capable of withstanding the high temperatures obtained in the reaction will not be so expensive as to affect adversely the cost of the gas produced. The pipes have to be handled in short lengths and be capable of being jointed underground to give an air-tight joint which will withstand the temperature conditions.

Surface Tests

Preliminary tests on suitable materials are carried out on the surface in dummy coal beds. Each bed contains about 20 tons of coal, sufficient to enable gasification for a period of four or five days. At the end of the experiments the lid of the bed is removed and the air pipes examined. In addition a programme of minor experimental work is connected with problems such as the ignition of the coal, air governors, air pipe jointing methods, etc.

The pilot plant is itself designed to give much experimental information and will be instrumented on a scale greater than would be necessary for a full-scale commercial plant. The full-scale plant would use longer galleries and boreholes and shafts would be sited further apart. A new accommodation block now being constructed will include a laboratory and workshop.

Assistants in the bacteriological laboratory examining food products for the presence of bacteria. This laboratory was placed on the fourth floor to obtain the maximum natural lighting. The benches are teak-topped with white Formica fronts and are 30 in. high to enable operators to sit comfortably

Benches and Fittings for Sainsbury's Labs Planned by Chief Chemist

PLANNING and design of benches and fittings of the new laboratories built by J. Sainsbury Ltd., at Blackfriars Road, London SE1, was carried out by Mr. E. F. Williams, chief chemist.

The building development department of the company were responsible for the building construction work and the benches and fittings were constructed to design by A. Gallenkamp and Co. Ltd.

The new laboratories are contained in a building which was originally a private house, becoming later a factory, and which presented many difficulties of conversion.

The building contains routine laboratories for bacteriology and chemistry, together with research laboratories for microbiology, biochemistry and physical chemistry, preparation rooms, media room, dark room etc.

The offices and library are accommodated on the first floor with ample storage facilities, and pilot plant room on the ground floor and basement.

In the cramped space available Mr. Williams has been able to incorporate features which make these laboratories among the most up-to-date in this country.

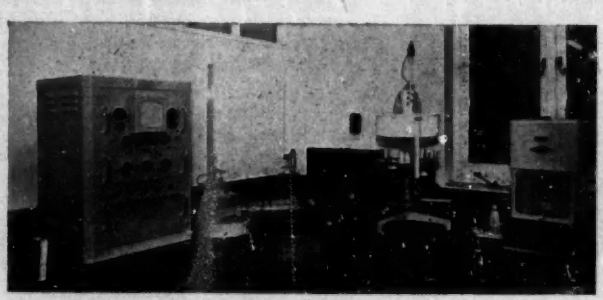
Major constructional alterations to the building had to be made. To give sufficient height for adequate ventilation in the chemistry laboratory a whole floor was removed. The roof of the building was raised to give a further three feet height to the bacteriological laboratory.

Great attention has been paid to laboratory lighting. Ceiling lights have been placed to give an intensity of 80 lumens per square foot at bench level with the minimum of shadow. To prevent possible glare the walls have been painted with a green paint which in Mr. Williams' words 'mops up glare.' By correct spacing of the lights, stroboscopic effects have been eliminated.

One of the most expensive items was bench tops for which teak is used. According to Mr. Williams teak is still the best material for laboratory benches, provided it is properly treated beforehand. Gas taps and electrical plugs are placed in special recesses at the back of the benches to prevent damage to apparatus.

The laboratory is well equipped with modern apparatus. A Southern Instruments cathode ray polarograph has been installed for the detection and estimation of trace metals, vitamin C and other chemicals. Equipment is available for reproducing a wide range of climatic conditions. This is important when studying the keeping qualities of foods under varying conditions and in varying packaging materials.

Cell respiration can be studied in an apparatus made by R. Braun of Germany. This incorporates accurate temperature control to within 1/100°C.



A corner of one of the research laboratories showing a Southern Instruments cathode ray polarograph, cell respiration apparatus and a Stanton balance

Although the main work of the laboratory must of necessity be routine control, a strong research unit has been built up and many long-term fundamental problems in microbiology and biochemistry are being investigated.

Methods have been elaborated for the extraction and estimation of muscle pigments, particularly in the form of nitroso myoglobin, and particular attention has been paid to the kinetics of light catalysed reactions causing fading of muscle pigments.

Investigations in the laboratory have revealed hitherto unknown types of bacteria occurring in meat brines and this work has now opened up new fields of investigation in the microbiology of foodstuffs.

The development of self-service has necessitated considerable research with packaging materials and this is being studied extensively.

The routine control section is responsible for the examination, both chemical and microbiological, of all raw materials, intermediate and final food products. The laboratory collaborates with laboratories of manufacturers in order to work out methods of control for the improvement of existing methods on materials being supplied to the company. The number of analyses carried out by the routine section will be approximately 24,000 for the current year as compared with 10,000 during 1953.

Controlling Use of Insecticides

LEGISLATION would not be necessary to control the use of insecticides, hoped Sir Solly Zuckerman, who is chairman of the advisory committee on poison substances used in agriculture and food storage. He was speaking at the second annual dinner of the Industrial Pest Control Association at the Trocadero Restaurant, London, on 12 November. He thought that Government regulations should not be a drag on the progress and initiative of the smaller firms.

Mr. B. C. Engholm, Ministry of Agriculture, Fisheries and Food, proposed the toast of the association, and the vice-president, Mr. D. J. S. Hartt, replied. Over 100 members and guests were also present.

Capital Investment in Chemical Industry

FIXED capital expenditure in the chemicals and allied industry in 1956 was 34 per cent higher than in 1955. Figures given by the Board of Trade for the first two quarters of 1957 show further increases.

The following table shows percentage increases in fixed capital expenditure during 1956 and 1957, compared with corresponding periods of previous years. It is based almost entirely on returns received from companies whose securities are quoted on UK stock exchanges.

		1st qtr.	2nd qtr.	3rd qtr.	4th qtr.	1956
Chemical and allied industries	1956	51	34	40	22	34
	1957	36	26			
All manufacturing industries	1956	29	26	13	17	20
	1957	13	9			

OXIDATION WITH CHROMIUM TRIOXIDE, by Dr. R. SLACK

POSSIBLE mechanisms of hydrocarbon oxidation have been examined by Dr. Slack who discussed some of his results in his paper on 'Oxidations with hexavalent chromium'*. By reference to the rate of oxidation of diphenylmethane with CrO_3 in glacial acetic acid, Dr. Slack showed that the normally accepted stoichiometry did not necessarily apply. Oxidations begin normally but the rate diminishes rapidly and much of the hexavalent chromium remains unreduced. The yield of benzophenone is correspondingly low. At temperatures below 40°C oxidation continues very slowly for some days until there is an approximately constant percentage of residual hexavalent chromium. Dr. Slack explained that two species of oxidising agent were, in fact, present—CrO_3 itself and some form of 'inhibited' CrO_3 which is only a feeble oxidising agent under the conditions described.

The inhibition is caused by the effective removal of CrO_3 by *trivalent* chromium with the production of chromic acetochromates of the type $Cr(OAc)_2(HCrO_4)$. The same inhibition, termed by Dr. Slack the ion effect, could be brought about by the addition to the system of any substance capable of converting active CrO_3 into relatively inactive chromate, dichromate or acid chromate. The part played by concentrated sulphuric acid in overcoming the ion effect was discussed, its main function being to displace the equilibria

$$CrO_3 + H_2O \rightleftarrows H_2CrO_4$$
$$H_2CrO_4 + CrO_3 \rightleftarrows H_2Cr_2O_7$$

and to remove interfering trivalent chromium irreversibly as chromic sulphate.

New reagents containing hexavalent chromium were then described. These were CrO_3 in pyridine, CrO_3 in the presence of acetone and tertiary butyl chromate, all of which had been introduced to increase the specificity of an otherwise rather unspecific reagent.

The yellow CrO_3-pyridine complex, $CrO_3.2C_5H_5N$, is moderately soluble in pyridine and sparingly so in benzene, dioxan and acetone. It was first described by Sisler *et al* in 1948 and its use in organic chemistry was developed by Sarett in 1953.

The particular merit of the reagent is that acid-sensitive groups, e.g. acetals and ketals, are unaffected and double-bonds and thioethers are not oxidised. High yields of aliphatic aldehydes can often be obtained from the corresponding alcohols but the reagent is of the greatest value in sterol chemistry.

The next reagent discussed, chromium trioxide in the presence of acetone, was introduced in 1946 by the Heilbron-Jones team for the conversion of secondary acetylenic carbinols and glycols into ketones:

$$R'C \vdots C.CHOHR \longrightarrow R'C \vdots C.CO.R$$

These oxidations are greatly influenced by the nature of the solvent, by the concentration of the reagents and by temperature. The most satisfactory procedure has been the addition of a solution of CrO_3 in dilute sulphuric acid to an acetone solution of the carbinol. Many triterpenoid alcohols and sterols react extremely smoothly and rapidly and despite the acid character of the reagent, the reactive 5:6 double-bond present in many sterols is not oxidised and does not migrate to the Δ^4 position.

Use of tertiary butyl chromate, and a convenient method for its preparation, were described by Oppenauer in 1949. These oxidations are normally carried out in dry tertiary butanol, light petroleum or carbon tetrachloride mixtures. This reagent also is widely used for the selective oxidation of both primary and secondary alcohols to aldehydes or ketones; double and triple bonds are not normally attacked.

Oppenauer's three variants of the reagent were discussed. The oxidation of cholesteryl acetate to 7-ketocholesteryl acetate could be carried out in 92 per cent yield by the use of a concentrate of tertiary butyl chromate in the presence of glacial acetic acid, a reagent that is particularly useful for the oxidation of reactive methylene groups.

Dr. Slack concluded by drawing attention to three types of chromium compounds among which new, highly selective oxidising agents might be found. These were (a) products similar to $CrO_3.2C_5H_5N$ in which pyridine was replaced by other organic bases. Many such derivatives had been prepared by Sisler but had not been used for organic oxidations; (b) acetylchromic and diacetylchromic acids, which were alleged (Pictet, 1903) to be milder oxidising agents than CrO_3 and which might exhibit a very high degree of specificity in the presence of organic bases and (c) the interesting group of salts of pentavalent chromium derived from $CrOCl_3$ and prepared by Weinland in 1905.

Finally, Dr. Slack drew attention to the dangers inherent in the use of CrO_3 and its derivatives. He recommended the addition of small amounts of the oxide as dry, powdered flake, with stirring and cooling, to the solvents. Any build-up of solid CrO_3 on stationary interface should be avoided and any residual excess of hexavalent chromium should always be destroyed with ferrous sulphate, oxalic acid or similar reducing agent.

* *Given at the CS and SCI symposium on 'Newer Preparative Methods in Organic Chemistry' (see CA, 16 November, p. 809).*

Applications of Metal Carbonyls

FROM the point of view both of applications in organic chemistry and existence of complexes containing metal, carbon monoxide and organic groups in the same molecule, the metal carbonyls of the first transitional series formed the most interesting and important group. This was stated by Mr. P. O. Lenel, in his paper on 'Some applications of metal carbonyls in organic chemistry'*.

The use of nickel carbonyl in organic chemistry was developed principally by Reppe for the synthesis of unsaturated carboxylic acids from acetylenes, carbon monoxide and an active hydrogen compound (water, alcohols) or saturated acids, starting with olefines or the next lower alcohols, esters or ethers. For carbonylating acetylenes there were stoichiometric and catalytic methods, said Mr. Lenel.

It was pointed out that substituted nickel carbonyls were useful as catalysts in polymerisation and cyclisation reactions of unsaturated hydrocarbons.

Cobalt carbonyl was the catalyst in the industrially important hydroformylation of olefines with carbon monoxide and hydrogen to give aldehydes and, after hydrogenation, alcohols. Cobalt carbonyl was also very useful, Mr. Lenel stated, in a number of other carbonylation type reactions, and the related cobalt hydrocarbonyl could catalyse homogenous liquid phase hydrogenations.

Iron carbonyl could be used in an alcohol synthesis from olefine, carbon monoxide and water, in a way somewhat analogous to hydroformylation.

Recently manganese carbonyl had entered the field of potential catalysts by the discovery of methyl and acetyl derivatives, mutually interconvertible; this represented a synthesis of acetic acid from methanol.

The best known complexes of metal carbonyls with organic compounds were the cyclopentadienyl metal carbonyls, whose chemistry has been vigorously investigated in recent years. However, the very wide variety of compounds of this kind available had not yet been put to any specific application.

Mr. Lenel said some complexes of acetylenes and dienes with metal carbonyls had also been described. The former could be considered as typifying the reactive intermediates in carbonylation reactions and thus help to explain the mechanism.

Further Soviet Work on Trimeric Acrylates

SOME OF the extensive literature on trimeric acrylates is reviewed and results of their own added by A. Ya. Drinberg *et al.* This is contribution No 8 of a series on this subject, and in the present case deals with alkyl group. (Zh.Prikladn. Khim. *J. Appl. Chem.*, 1957, **30**(8), 1204-1214.)

The acrylic polymers (beginning with ethyl-) and the methacrylic (beginning with propyl-) when heated in thin layers (films) in air in the temperature range 160°C to 200°C are converted into insoluble tripolymers. The relative tendency to do so is determined by the structure of the monomer: length of carbon chain of the alcohol radical, nature of substitution in the *alpha* position, and so on. Conversion is effected at the interface of the polymer-air phase and is a function of the specific surface of test material. Inter- (or cross-) linkage of the polymers is accompanied by enrichment or concentration of their polar groups, as evidenced by increased solubility and swelling in polar solvents; also by greater thermal stability and other changes.

MANCHESTER EXHIBITION SHOWS USES OF BONDED FIBRE FABRICS

BONDED fibre fabric is the subject of an exhibition now being held by Courtaulds' Use-Development Organisation in Manchester by Bonded Fibre Fabrics Limited. The exhibition opened to the trade on 18 November and will close on 29 November.

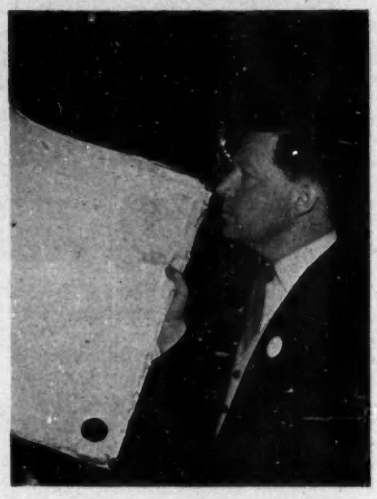
The overall demand for bonded fibre fabrics is increasing, and some idea of the world demand for these materials is given by the anticipated total world production of 80,000,000 lb. in 1957, and the 200,000,000 lb. forecast by 1961.

Mr. J. P. Koppel, chairman of Bonded Fibre Fabric, told CHEMICAL AGE that it was by avoiding the complexities of traditional textiles, that bonded fibre fabric production achieved its economic advantages.

The exhibition demonstrated the use of these fabrics in the chemical and other industries. One important application shown was in filtration. Here, the particular advantage of bonded fabric was that substantially all the constituent fibres, instead of being twisted into yarns, were uniformly distributed so as to contribute their share in the filtration processes. It was stated that the vital property of porosity was present in bonded fabrics.

These fabrics are used for very many different filtration jobs, including the filtration of grinding coolants, acetate dope, diesel fuel oil, electro-plating solutions and milk.

Included in the exhibition are dry batteries, in various stages of manufacture, showing the use of parallel-laid viscose bonded fabric as a wrapping for carbon bobbins, and supplied by Ever Ready (GB) Ltd., London. Wet batteries, illustrate the use of viscose bonded fabric in lead oxiding of plates for wet batteries and two dummy batteries, were supplied by Manchester Batteries Ltd., Sale, Ches.



G. N. Sellers, assistant sales manager of Bonded Fibre Fabrics, examines the cross-laid viscose bonded fabric filter for the filtration of rubber hydrochlorides

Among filtration exhibits, is a laboratory filter unit dressed with viscose bonded fabric, and supplied by L. A. Mitchell Ltd., Manchester.

Stereo-block Polymers Suitable for Synthetic Rubbers

ISOTACTIC and stereo-block polymers of propylene are the subject of a report by G. Natta, G. Mazzanti, G. Crespi and G. Moraglio. Polymerisation of propylene by means of stereospecific catalysts yields, beside high-crystalline isotactic polypropylenes, less crystalline and amorphous polymers. The separation of crude polymers into increasingly complex polymerisation fractions is achieved by extraction through a series of selective solvents at high temperatures. The percentage share of the various types of polymers extracted depends primarily on which catalysts are used for polymerisation. Solid crystalline catalysts such as TiC_3, $TiCl_2$, VCl_3 mainly supply isotactic polypropylenes while other catalysts, especially liquid ones, such as $TiCl_4$ or $VOCl_3$, yield substantial amounts of low-crystalline or amorphous polypropylenes.

A series of solvents suitable for this kind of separation would be acetone-ether-pentane-hexane-heptane-ethyl hexane-octane. The low-crystalline and amorphous products obtained are by no means the usual amorphous polypropylenes produced by use of Friedel-Crafts catalysts but completely straight polypropylenes with head-tail linking which do not owe their low crystallinity, and the high solubility and low melting temperature which this involves, to a lower molecular weight but to a less regular spatial arrangement of the tertiary carbon atoms in the chains of polymers.

The low-crystalline polymers obtained in large amounts were described as stereo-block polymers because isotactic segments of greater or lesser length alternate with spatially irregular segments in their straight chains of polymers. Polymers containing tertiary carbon atoms which show no spatial order at all are amorphous.

The physical factor most suitable for determining the degree of spatial order in the stereo-block polymers is the melting point which varies from 110°C to 175°C (the melting point of pure isotactic polymer) according to the degree of regularity in the chains of polymers. Their specific physical structure gives the stereo-block polymers the properties of true elastomers which suggests that they are particularly suitable for the production of synthetic rubber. (*Chim. e l'Ind.*, Milan, 1957, **36**, 275.)

Shell Refinery Gases for North Thames Gas Board

ARRANGEMENTS have been made by the North Thames Gas Board with Shell Refining Co. for the board to receive 25-million cu. ft. of gas a day for a period of 10 years, beginning in the middle of next year. This supply of gas is equivalent to the gas produced from 250,000 tons of carbonisation coals a year and represents about six per cent of the North Thames Gas Board's total production.

The gases, mainly a by-product of the refinery processes at Shellhaven, have an average calorific value of 1,500 B.Th.U. per cu. ft. At present the gases are used at the refinery to provide process heating and when sold to the board will be replaced, probably by fuel oil.

Preliminary purification is to be undertaken at Shellhaven, after which the gas will pass to the Romford gasworks by a 24-inch, 15¼-mile long steel pipe which has already been laid by William Press and Son at a cost of £500,000. Initial load of the rich gas per day which will be carried by the pipe, will be 14 million cu. ft., although the potential capacity of the pipe is about 10 million cu. ft. per hour. The pipe will hold at 275 lb. p.s.i. pressure, 5 million cu. ft. of gas and has the equivalent capacity of a storage holder of the same cost.

On reaching the Romford works, the gas will be metered and the pressure reduced to about 7 lb. p.s.i. It is expected that 36 million cu. ft. a day of 500 B.Th.U. gas suitable for domestic use will be produced by the four new catalyst vessels. Part of the plant is stated to be suitable for using primary flash distillate or light spirit as a raw material. A new pumping installation will deliver the gas into the grid.

Total cost of the project will be £1,789,000; it will produce as much gas as a conventional coal carbonising unit which today would cost nearly £4½ million. The capital cost will be 1d a therm compared with 2.90d a therm by traditional plant.

Work Starts on Expansion at Grangemouth Refinery

WORK has started on a £6 million expansion project at British Petroleum's refinery at Grangemouth, Scotland. The scheme is designed to increase the processing capacity from 2 million to 3,100,000 tons a year. A new crude oil distillation unit is to be erected and it will replace part of the present distillation plant.

Associated with the new unit is a copper chloride unit, a de-ethaniser, which will increase the quantity of propane produced, and gas oil and kerosine treatment units. It is expected that the new distillation unit will be completed early in 1959 and the whole scheme later that year.

Grant to BA

The British Association for the Advancement of Science is receiving £500 a year for five years from the Dunlop Rubber Co.

Only One Sample Not Up To Standard, Says Salford Analyst

OF 792 samples examined for preservatives, states the annual report of the City of Salford's medical officer of health (Dr. J. L. Burn), which includes the report of the city analyst, A. Alcock, only one, a sample of beef sausage, failed to conform to the Public Health (Preservatives) Regulations.

Sausage may contain up to 450 parts per million of sulphur dioxide, it is observed, but its presence must be declared to the purchaser, either on a label wrapping the sausage or on a notice displayed in a conspicuous position in the place of sale. In this case the limit of 450 parts per million was not exceeded, but no intimation was given to the purchaser of its presence.

Regarding metallic contamination, the report notes that 'it is hoped to carry out some research into rapid methods using polarographic and spectrophotometric techniques for the determination of trace metals as soon as a full establishment of laboratory staff can be attained.'

Under the heading of 'drugs' is liquid paraffin, sample No. B. 1641. This informal sample on testing was found to fail to comply with the British Pharmacopoeia test for carbonisable impurities.

Although it was not sold as Liquid Paraffin BP it was recommended as a medicine for internal consumption and the city analyst felt therefore that it should satisfy the tests laid down in the British Pharmacopoeia for medicinal liquid paraffin. Enquiries showed that the pharmacy where this drug was sold bought the liquid paraffin in bulk and bottled it for sale on the premises. A formal sample was procured from the bulk supply, but this, on test, satisfied British Pharmacopoeia requirements. It could only be concluded that the 'impurities had originated from the bottles.'

Household Ammonia

During the year under review, two samples of phenol disinfectant and four samples of household ammonia were examined. One of the samples of household ammonia was incorrectly labelled, while two were deficient of their stated ammonia content. These irregularities have been pointed out to the packers and the stocks have been withdrawn from sale.

In addition to analysing samples submitted under the Food and Drugs Act and related legislation, the public analyst is also the official agricultural analyst for the County borough.

Six samples of feeding stuffs and five fertilisers were examined under the above Act. One of the fertilisers purchased at a Salford shop, submitted informally as superphosphate of lime with a declared content of 18.5 per cent of water-soluble phosphoric acid, was found on analysis to contain only 0.35 per cent of water-soluble phosphoric acid. A formal sample was therefore obtained and an identical result was obtained on analysis. Further investigation showed the samples to be crude gypsum.

These results were communicated to the Ministry of Agriculture, Fisheries and Food, whose investigation failed to reveal any further lots of this material at the wholesalers from whom the Salford shop proprietor alleged that he purchased a 14 lb. bag. It was, therefore, only the parcel sent to the shop proprietor which was under suspicion, and there seemed to be no evidence as to how this bag sampled by the Inspector on the retailer's premises and which bore particulars relating to superphosphate came to contain material which was comparatively worthless for fertilising purposes and was certainly not superphosphate.

Discussing atmospheric pollution, the report refers to certain deposit gauge observations which were taken. The pH value of 3.80 obtained indicates that the rainwater is acid in reaction, which accounts for its corrosive action on paint and buildings, the acid being derived from the solution of sulphurous impurities in the air arising from the burning of solid fuel. Sulphurous gases in the atmosphere were also measured at two sites by the 'lead peroxide' method.

Results obtained from measurements by volumetric apparatus for sulphur dioxide and smoke showed a much heavier pollution in winter but it is noted that 'the concentrations of smoke and sulphur gases in the atmosphere during the winter months were somewhat higher than for the last few years, but this may have been due to the cold, still, dry weather which was experienced. The results for the spring, summer and autumn months showed no variation.'

Plastics Aids to Building Industry

HOW all-weather work is now possible in the building industry under a transparent plastics 'umbrella' is shown at the Building Exhibition, Olympia, open from 13 to 27 November. Operatives can carry on in natural light under their waterproof roof, whatever the weather outside, in mobile shelters of Visqueen polythene film made by British Visqueen Ltd. Dust and dirt shields, or temporary glazing for window spaces, providing a 'barrier' between constructional and normal working operations, can also cut down working delays on site.

Uses of the film in construction include heat insulation and, being impervious to acids or alkalis, as an underlay for concrete slabs.

Similar properties in constructional use are offered by Bakelite polythene film which on building sites can be used as a wind-break, temporary glazing or protection for stores.

Another new product by Bakelite is a decorative structural panel, produced by Martin Goacher and Co. Ltd., Guildford, of polyester resin reinforced with glass fibre material. This panel incorporates thermal insulation; can be coloured or virtually transparent; and despite great strength and corrosion resistance, is extremely light in weight (an 18-sq. ft. panel weighs 13½ lb.).

Two new materials from ICI Ltd., designed to be both decorative and protective, are a p.v.c. sheet for bonding to walls and interior surfaces and a new p.v.c. foil for laminating to metal and other surfaces.

The Yorkshire Copper Works are showing polythene tubing and fittings for cold water plumbing services. The exhibitors claim many advantages for their 'Plastronga' (high strength) polythene, made by low-pressure process, with a tensile strength of 3,600 lb. per sq. in., compared with 1,400 lb. required of ordinary polythene tubes under the standard specification BS 1972.

ICI and Bakelite are among other companies showing piping, which, 'burst-free', non-corrosive and combining strength and lightness, is being used on an increasing scale for homes, industry and in agriculture.

Leicester, Lovell and Co., Ltd., and Aero Research Ltd., demonstrate the use of plastics in resins and glues as structural adhesives.

Another new product is the first solid vinyl floor tile by Marley Tile Co. Ltd., which is claimed to be virtually indestructible and as flexible as rubber.

Phoenix flooring, by Phoenix Rubber Co. Ltd., available in sheet as well as tile form, has high resistance to spillage, including fats, oils, alkalis and dilute acids. Phoenix also demonstrate rigid p.v.c. extrusions made to customer's own designs for internal building purposes such as various building sections, mouldings, ceiling hangers, etc.

Construction of the UK's Second Harwell to Start

CONSTRUCTION work on the UK Atomic Energy's £20 million Winfrith Heath atomic research station starts on 25 November. This station will be a second Harwell devoted entirely to the development of new types of nuclear reactor furnaces and will be the largest station of its kind in Europe.

The zero energy high temperature gas-cooled reactor which will cost about £2 million, will burn atomic fuel consisting of a mixture of thorium and uranium-233. The uranium will be used to 'breed' new uranium-233 from the thorium within the reactor furnaces. Operating temperature of the reactor will be about 800°C and it will use hollow ceramic fuel elements. Only one-hundredth of the amount of graphite moderator material required by the Calder Hall type nuclear power producing furnaces will be necessary.

Two prototype reactor units for use in propelling surface ships are likely to be constructed, as also an experimental power-producing reactor furnace designed to burn liquid uranium in the form of uranium salts mixed with water.

DAY-KESTING PROCESS FOR LOW-COST CHLORINE DIOXIDE

CHLORINE DIOXIDE produced at a cost one-half that of any competitive process—namely 10 to 13 cents per lb. compared with 23 to 26 cents per lb. is reported by Brown Co., US (*Chem. Engng.* 1956, **64**, No. 11, 143). Using the Day-Kesting process, the dioxide is produced by reduction of sodium chlorate. Unlike other ClO_2 processes which use the chlorate, the process makes its own.

The Day-Kesting process was devised by G. A. Day, of Brown Co., US, and E. E. Kesting, of Elektrochemische Werke, West Germany. Experience gained from six recent European installations has been incorporated in the 1.5-ton-a-day $625,000 unit at Brown's, Berlin, NH kraft pulp mill. M. H. Treadwell Co., New York, who adapted the design are now offering the process for licensing.

After start-up the Day-Kesting process requires essentially only hydrochloric acid and electrical power as raw materials. The reaction which produces chlorine dioxide involves reduction with hydrochloric acid of sodium chlorate in a circulating stream of liquor. Chlorate is present in excess to ensure the highest efficiency of the reaction. Products of the reaction are chlorine and chlorine dioxide which are stripped out by an air stream and a spent liquor containing sodium chloride and left-over chlorate. It is this solution which makes the electrolyte for the electrolysis of sodium chloride to chlorate. Sodium chloride-sodium chlorate solution, recycling from reduction stage, feeds at the rate of 200 g.p.m. through a flash cooler to the cell room.

Electrolyte Volume

A bank of 20 parallel-linked, 4 x 9 x 3 ft., 10,000 amp. steel electrolytic cells provides, together with a storage tank, a total electrolyte volume of 16,000 gal. Cells, fitted with graphite anodes and steel cathodes, operate at 105°F. A selenium rectifier applies 3 volts d.c. across each. The cell units do not have diaphragms. Sodium chromate, introduced to the electrolyte, plates out on the cathodes forming a type of diaphragm. Its function is to improve current efficiency, which is of the order of 80 per cent.

Hydrogen, which is produced, is allowed to escape to the atmosphere. The cell liquor, composed of 400 g/l $NaClO_3$ and 90 g/l NaCl, feeds to a storage tank. The liquor is then filtered through a bag-type filter to remove any graphite flaked from the anodes. A cartridge-type filter removes any contaminants that would cause dioxide decomposition before the solution enters the reduction reactors.

The reactor stage consists of six Saran- and brick-lined steel tanks, 4 ft. diameter by 5 ft. high, connected in a cascade series. Filtered cell liquor and 20°Be HCl feed to the first tank, then cascade down the line. Reaction temperatures vary from 95°F in the first tank to 212°F in the last two where steam is injected.

Air enters the fourth reactor tank and flowing counter-currently upstream, strips out chlorine and chlorine dioxide from the solution. The exit gas, which contains about 10 per cent chlorine, 10 per cent chlorine dioxide and 80 per cent air, passes to a 30-inch diameter 30-ft. high packed column, where chlorine dioxide is absorbed in water to form a 0.5 per cent ClO_2 solution. The residual chlorine ends up as sodium hypochlorite.

Compared with the European Day-Kesting installations the Brown plant utilises steel for its equipment in preference to ceramic and stoneware equipment. Also rigid polyvinyl chloride is used for some 80 per cent of the process piping. More instruments are used to cut down need for highly skilled manpower. Also steam jets are used instead of mechanical vacuum pumps.

Future Day-Kesting plants will have further modifications such as are described below.

The flash cooler that now concentrates solution recycling from reduction process to electrolysis will be eliminated. To permit this elimination closed steam coils rather than direct steam injection, will supply heat to reduction reaction. This allows the introduction of water to electrolyte at the reduction stage. Also the coils, working in conjunction with a condenser, will serve as an evaporator to concentrate the electrolyte before it recycles from reduction reactors to electrolytic cells.

Electrolytic cells, which are cheaper to build and install, are proposed for future plants. Copper bus work will be minimised to make it easier to short-circuit cells for maintenance. Germanium rectifiers instead of the present selenium rectifiers will be used for improved power efficiency.

To produce one pound of dioxide, 5.5 kWh. power, 1.6 lb. HCl, 0.03 lb. graphite, and 7.5 lb. steam are required. About 1 lb. of chlorine is claimed to be recovered as hypochlorite.

From the economic viewpoint, a 1.5 ton/day unit costs $315,000 more than most competing processes' installations. However, by turning out the dioxide at half the price, an annual saving of $130,000 is possible for the plant. In larger plants, the cost figure becomes more attractive, state M. H. Treadwell Co. Thus while the 1.5 ton/day unit will pay off the difference in 2½ years, the 5 ton/day unit can pay off in 20 months.

Simple Continuous Solid-Liquid Extractor Developed in New Zealand

AN extractor which has evolved from the experience of D. S. Letham *et al.*, Ruakura Animal Research Station Department of Agriculture, Hamilton, New Zealand, for use in continuous solid-liquid extraction of amounts of 500 gm. of ground dried material has been described (*N. Zealand Sci. and Technol.*, 1957, **38**, No. 7, 695). Advantages of the present design over other extractors is said to be the simple and efficient all-glass extractor. Also, it can be readily constructed from laboratory glassware; it occupies a minimum of bench space; it is easily assembled and cleaned; extraction is performed just under the boiling point of the solvent; and a battery of these extractors can be used to extract several kilograms of material in a short time and without the disadvantages such as an extended time of extraction and channelling usually found in larger scale extractors.

The extractor has been used in various sizes to hold from 50 to 500 gm. of plant material. For holding 550 gm. or more of denser material, a Pyrex 1.57 low-form beaker is used as the container. Sealed to it near its base is a side arm of 6 mm. tubing with the exit-portion lying along the beaker and bent over for about one inch, at about one inch from the top of the beaker. The bottom of the beaker is covered with a thin pad of cotton-wool raised to cover the entrance to the side-tube; the plant material is pressed in lightly and covered with a layer of cotton-wool.

Support for the container is from a glass rod or wide tubing, in a 4 or 5l Pyrex beaker. Solvent is poured on to the container until solution flows from the side tube and the outer beaker is filled with at least 1½ inches of solvent. The outer beaker is sealed at the top by a 3l round-bottomed flask arranged as a condenser and the lip of the beaker is plugged with cotton-wool. The condenser-flask is clamped so that it rests lightly on the large beaker. Heating is from a small hot plate covered with asbestos paper.

Letham *et al.*, claim that the extractor functions rapidly and efficiently with little or no channelling. It is of the continuous-drip type, the mode of operation of which is claimed by these workers to be as effective as siphoning.

The most used solvent has been ether but equally good operation has been obtained, it is recorded, with many solvents including petroleum ether, acetone, ethyl acetate, methanol, and ethanol, and also with ethanol containing water or acid. An extraction time of 8 to 12 hours has usually been used, after which little or no colour was found to be extracted.

Colonial Products Laboratory

From 1 January, the Colonial Products Laboratory will occupy new premises and will be renamed the 'Tropical Products Institute'. The new headquarters will be at 56–62 Gray's Inn Road, London WC1 (telephone: Chancery 5412–9).

SYNTHETIC FIBRES OF THE WORLD

Trade Names, Base Materials and Manufacturers Listed

THE trade names of synthetic fibres, together with the manufacturers, have been compiled by Dr. Max Luthi, editor of *Chemische Rundschau* (15 October, 1957) from a list prepared by Dr. A. J. Werner, Farbenfabriken Bayer. Additions to Dr. Werner's list have been made by Dr. Luthi, to whom we are indebted for permission to publish the list.

Abbreviations for the base material and manufacturing process:

V = Viscose process
C = Cellulose
K = Cuprammonium process
A = Acetate process
Pam = Polyamide
Pvc = Polyvinylchloride
Pst = Polystyrol
Pa = Polyacrylonitrile
Pva = Polyvinylalcohol
Pae = Polythene
Pe = Polyester
Pe T = Polyester Terylene
Pur = Polyurethane
Pr = Protein
Mp = Mixed polymerisate

Name	*Base material or process*	*Company*
Acele	CA	E. I. Du Pont de Nemours & Co., Wilmington, US
Aceta	CA	Farbenfabriken Bayer AG, Leverkusen, Dormagen
Acetat Ips	CA	Courtaulds Ltd., London
Acrilan	Mp	Chemstrand Corp., Decatur, US
Agfa	CV	Film- und Chemiefaserwerk Agfa, Wolfen, East Germany
Akulon	Pam	Algemeene Kunstzijde Unie, Arnhem
Alastra	CV	Fabelta, Brussels
Albene	CA	Societe Rhodiaceta, Lyons, France
Algil	Mp	Polymers Inc., Middleburg, US
Alginate	Pr	Courtaulds Ltd., London
Amilan	Pam	Toyo Rayon Co. Ltd., Nagoya, Japan
Amilar	Pe	E. I. Du Pont de Nemours & Co., Kingston, US
Aralac	Pr	National Dairy Prod., Corp., US
Ardil (*Production ceased*)	Pr	ICI Ltd., Dumfries
Armon	CV	Soc. Suisse de la Viscose, Emmenbrücke
Arnel/X-100/	A	Celanese Corp. of America
Avcoset	CV	Am. Viscose Corp., Meadville
Avisco	CV	Am. Viscose Corp., Meadville
Avisco PE	Pae	Am. Viscose Corp., Meadville, US
Azlon	Pr	Virginia Carolina Chem. Corp., Taftville
Belastraw	CV	Hartford Rayon Corp., US
Belimat	CV	Fabelta, Brussels
Bemberg	CK	I. P. Bemberg AG, Wuppertal
Bexan	Pvc	BX Plastics Ltd., Nr. Manningtree
Bobina Reyon	CV	Bobingen AG fur Textilfaser, Bobingen
Bobol	CV	SNIA Viscosa, Milan
Boltaflex	Mp	Bolta Saran Inc., Lawrence
Briglo	CV	American Enka, New York
Bubblfil	CV	E. I. Du Pont de Nemours & Co., Wilmington
Cargau	Pr	Le Lanital Belge, Anvaing
Casenka	Pr	Algemeene Kunstzijde Unie, Arnhem
Caslen	Pr	Rubberset Co., Salisbury, US
Casolana	Pr	Vereenigung Melkwolfabrik Casolana, Holland
Celafibre	CA	British Celanese Ltd., London
Celanese	CA	Celanese Corp. of America
Celaperm	CA	Celanese Corp. of America
Celcos	CA	Celanese Corp. of America, New York
Celechrome	CA	Canadian Ltd., Drummondville
Celta	CV	Soc. de la Viscose Suisse, Emmenbrücke
Chardonize	CV	Celanese Corp. of America, New York
Chemstrand	Mp	Chemstrand Corp., Decatur
Chromspun	CA	Tennessee Eastman Corp., Kingsport
CIL Nylon	Pam	Canadian Industries Ltd., Kingston, Ontario
Cisalfa	CV+ Pr	SNIA Viscosa, Milan
Colcesa	CV	Glanzstoff-Courtaulds, Köln-Weidenpesch
Colcord	CV	Glanzstoff-Courtaulds, Köln-Weidenpesch
Colnova	CV	Glanzstoff-Courtaulds, Köln
Colomal	CV	Glanzstoff-Courtaulds, Köln
Coloray	CV	Courtaulds Ltd., Coventry
Colva	CV	Glanzstoff-Courtaulds, Köln
Cordura	CV	E. I. Du Pont de Nemours & Co., Wilmington
Courlene	Pae	Courtaulds Ltd., London
Courpleta	CA	Courtaulds Ltd., London
Courtaulds	Pr	Courtaulds Ltd., London
Covadur	CV	Glanzstoff-Courtaulds, Köln
Cremona	Pva	Kurashiki Rayon Co., Okajama, Japan
Creslan	Mp	American Cyanamid Co., Stamford, US
Crinovyl	Pc	Rhovyl S. A., Tronville-en-Barrois, France
Crylor	Pa	Soc. Rhodiaceta S. A., Lyons, France
Cuprador	*	Farbenfabriken Bayer AG, Leverkusen, Dormagen
Cupralon	†	Farbenfabriken Bayer AG, Leverkusen, Dormagen
Cuprama	CK	Farbenfabriken Bayer AG Leverkusen, Dormagen
Cupresa	CK	Farbenfabriken Bayer AG, Leverkusen,
Cyana	Mp	American Cyanamid Co., Stamford, US
Dacron	Pe T	E. I. Du Pont de Nemours & Co., Kingston, US
Dawbarn	Mp	Dawbarn Bros. Inc., Waynesboro, US
Dayan	Mp	Perlofil S. A., Madrid
Dien	Pam	N. V. de Bataafsche Petroleum Mj., Amsterdam
Dinitril	See Zetek	B. F. Goodrich Chemical Co., US
Diolen	Pe	Vereinigte Glanzstoff-fabriken, Wuppertal
Dolan	Pa	Suddeutsche Zellwolle AG, Kehlheim
Dorlon	Pam	Farbenfabriken Bayer AG, Leverkusen, Dormagen
Draka-Saran	Mp	N. V. Holl. Draad en Kabelfabriek, Amsterdam
Dralon	Pa	Farbenfabriken Bayer AG, Leverkusen, Dormagen
Drawinella	CA	Wacker-Chemie GmbH, Munchen
Ducilon	Pam	Ducilo S. A., Berazategui
Dynel	Mp	Union Carbide Corp.
Eastman Acetate	CA	Eastman Chemicals Products Inc., US
Efylon	Pam	(Abfallfaser), Hungary
Enka	Pam	American Enka Corp., Enka
Enkalene	Pe T	Allgemeene Kunstzijde Unie, Arnhem
Enkalon	Pam	Allgemeene Kunstzijde Unie, Arnhem
Feathery	CV	E. I. Du Pont de Nemours & Co., Wilmington
Fibramine	CV	Fabelta, Brussels
Fibrelta	CV	Fabelta, Brussels
Fibro	CV	Courtaulds Ltd., London
Fibrocella	CA	Courtaulds Ltd., London
Fibrolane	Pr	Courtaulds Ltd., London
Fibrovyl	PC	Soc. Rhovyl S. A., Tronville-en-Barrois, France
Fioco	CV	SNIA Viscosa, Milan
Flox	CV	Spinnfaser AG, Kassel-Bettenhausen

* *Cuprama and Dralon* † *Cuprama and Perlon*

Name	Base material or process	Company
Forlion	Pa	S. A. Orsie Mangelli, Forli, Italy
Fortisan	CA	Celanese Corp. of America
Frilon	Pam	Inquitex S. A., Spain
Furon	Pam	Phrix Werke AG, Hamburg; Jelenia Gora, Poland
Gecesa	CV	Glanzstoff-Courtaulds, Köln-Weidenpesch
Geon	Mp	Goodyear Tyre and Rubber Co., US
Glanzstoff	CV	Vereinigte Glanzstoff-Fabriken AG, Wuppertal
Grilon	Pam	Fibron AG, Ems
Harlon	Mp	Intern. Galalith GmbH, Hamburg
Imelon	Pa	Hoffner Rayon & Co. of Philadelphia
Isovyl	Pvc	Soc. Rhovyl S. A., Tronville-en-Barrois, France
Jetspun	CV	American Enka Corp. Enka
Kanebian	Pva	Kanegafuchi Spinning Co., Ltd., Yodogawa, Japan
Kapron	Pam	Klin-Moskau, Russia
Kelheim	CV	Suddeutsche Zellwolle AG, Kelheim
Kufasa	CK	Ehem. Kuttner, Pirna-jetzt Kunstseidefebrik Pirna-Copitz, E. Germany
Kuralon	Pva	Kurashiki Rayon Co., Okajama, Japan
Kuravilon	Pva	Kurashiki Rayon Co., Okajama, Japan
Kurehalon	Mp	Kureha-Kasei Spinning Co., Inagawa, Japan
Kuremona	Pva	Kurashiki Rayon Co., Okajama, Japan
Kuseta	CK	Ehem. Kuttner, Pirna-jetzt Kunstseidefabrik Pirna-Copitz, E. Germany
Lactofil	Pr	Allgemeene Kunstzijde Unie, Amsterdam
Lanital	Pr	Le Lanital Belge, Anvaing
Lanon	Pe	Thur. Kunstfaserwerk 'Wilh. Pieck', Schwarza E. Germany
Lanusa	CV	Badische Anilin- und Soda fabrik AG, Ludwigshafen
Lilion	Pam	SNIA Viscosa, Milan
Lonzona	CA	Lonzona, Sackingen, Gesellschaft fur Acetatprodukte GmbH
Lus-Trus	Mp	Lus-Trus Extruded
Tygan	see.	Plastics Inc., Ann Arbor
Marlspun	CA	Courtaulds Ltd., London
Merinova	Pr	SNIA Viscosa, Milan
Meryl	V	Comptoir des Textiles artificiels, Paris
Mewlon	Pva	Dai Nippon Spinning Co., Sagoshi, Japan
Mirlon	Pam	Plabag AG, Romanshorn
Movyl	Pvc	Polymer Industrie Chimiche, Terni, Italy
Nailon	Pam	S. A. Rhodiatoce, Casoria, Italy
Nefa	Pam	Vereinigte Glanzstoff-Fabriken, Wuppertal
Nefalon	Pam	Vereinigte Glanzstoff-Fabriken, Wuppertal
Newlon	Pva	Dai Nippon Spinning Co., Sagoshi, Japan
Niplon	Pam	Nippon Rayon Co., Uji, Japan
Nitrilon	Pa	Svit National, Kirow-Institut, Leningrad
Northylen	Pae	Norddeutsche Seekabelwerke, Nordenham/Oldenburg
Novamat	CV	Glanzstoff-Courtaulds, Köln-Weidenpesch
Novodur	Pam	Czechoslovakia
Nylenka	Pam	American Enka Corp., Enka
Nylon (See Tynex)	Pam	E. I. Du Pont de Nemours & Co.; Deutsche Rhodiaceta AG, Freiburg i. Br.
Nylon BNS	Pam	Br. Nylon Spinners, Pontypool
Nymo	Pam	Bolding Corticelli, Connecticut
Opaceta	CA	Courtaulds Ltd., London
Orlon	Pa	E. I. Du Pont de Nemours & Co., Wilmington
PAN	Pa	Farbenfabriken Bayer AG, Leverkusen, Dormagen
Pe Ce	Pvc	Filmfabrik Agfa, Wolfen & BASF, Ludwigshafen
Pe Ce N	Pvc	
Pe Ce 120	Pvc	Casella Farbwerke Mainkur AG, Frankfurt a. M.
Perlofil	Pam	Perlofil S. A., Madrid
Perlon	Pam	Die Mitglieder des Perlon-Warenzeichenverbandes
Perlon U	Pur	Farbenfabriken Bayer AG, Leverkusen, Dormagen
Permalon	Mp	Firestone Plastics Co., US
Phrilon	Pam	Phrix-Werke AG, Hamburg
Phrix	CV	Phrix-Werke AG, Hamburg
Plavia	CV	Sächsische Zellwolle, Plauen, Poland
Polan	Pam	Zaklady Wlokien Sztucznyto, Gorzowie, Poland
Polathene	Pae	ICI Ltd., Wilton
Polyethylene	Pae	Union Carbide Corp., South Charleston
Polyfibre	Pst	Dow Chemical Co., US
Polymer R	Pam	Rehoboth Research Lab., Israel
Polythene		E. I. Du Pont de Nemours & Co., Wilmington
Prezenta	CV	Kunstseidewerk Friedrich Engels, Premnitz, E. Germany
Rayolande	CV	Courtaulds Ltd., London
Redon	Pa	Phrix-Werke AG, Hamburg
Reevon	Pae	Reeves Bros. Inc., Spartanburg
Rehovot	Mp	The Un. Saran Plastics, Rehovot, Israel
Rekylon	Pam	E. I. Du Pont de Nemours & Co., Wilmington
Rhodia	CA	Dt. Rhodiaceta AG, Freiburg
Rhodiafil	CA	Dt. Rhodiaceta AG, Freiburg
Rhodialin	CA	Dt. Rhodiaceta AG, Freiburg
Rhodia Nylon	Pam	S. Rhodiaceta S. A., Lyons, France
Rhofil	Pvc	S. Rhodiaceta S. A., Lyons, France
Rhovyl	Pvc	Soc. Rhovyl S. A., Tronville-en-Barrois, France; Dt. Rhodiaceta AG, Freiburg
Rilsan	Pam	Soc. Organico, Paris
Rilson	Pam	SNIA Viscosa, Milan
Rotwyla	CV	Rottweiler Kunstseidefabrik AG, Rottweil
Roylon	Pam	Feldmuhle AG, Rorschach, Switzerland
Safa Nylon	Pam	Safa S. A., Blanes, Spain
Sanderit	Pam	Fr. Sander Nachf., Wuppertal
Saran	Mp	The National Plastics u. a. m., US; Bolta-Werke, Nürnberg
Sarelon	Pr	Southern Regional Research Laboratories, US
Schwarza	CV	Thür. Kunstfaserfabrik 'Wilhelm Pieck', Schwarza, E. Germany
Seraceta	CA	Courtaulds Ltd., London
Setilose	CA	Fabelta-Tubize, Belgium
Silcool	Pr	Showa Sangyo Kaisha, Japan
Silon	Pam	Kovosvit, Zlin, Poland
Sirius	CV	Vereinigte Glanzstoff-Fabriken, Wuppertal
Sniol	Pvc	SNIA Viscosa, Milan
Soylon	Pr	Drackett & Co., US
Steelon	Pam	Zaklady Wlokien Sztucznych, Gorzow, Poland
Styroflex	Pst	Ndd. Seekabelwerke AG, Hamburg
Suda	CV	Japan
Super Rayflex	CV	American Viscose Corp.
Supramid	Pam	Bad. Anilin- und Sodafabrik, Ludwigshafen
Suprema	CV	VEB Kunstseidewerk Premnitz, E. Germany
Supron	Pam	Kalle & Co., Wiesbaden-Biebrich
Synthofil	Pva	Wacker-Chemie GmbH, Munchen
Teca	CA	Celanese Corp. of America, New York
Teflon	Pae	E. I. Du Pont de Nemours & Co., Wilmington
Tenasco	CV	Am. Viscose Corp.
Tergal	Pe	S. Rhodiaceta, Besançon, France
Terital	Pe	Rhodiatoce, Casoria, Italy
Terlenka	Pe	Allgemeene Kunstzijde Unie, Arnhem
Terylene	PeT	ICI Ltd., Wilton
Thermovyl	Pc	Rhovyl S. A., Tronville-en-Barrois, France; Dt. Rhodiaceta AG, Freiburg
Thiozell	Pr	Thür. Kunstfaserfabrik 'Wilhelm Pieck' Schwarza, E. Germany
Tiolan	Pr	Thür. Kunstfaserfabrik 'Wilhelm Pieck' Schwarza, E. Germany
Toramomen	CV	Ryoto Rayon Co., Japan
Travis	CV	Kunstseidewerk Fr. Engels, Premnitz
Trelon	Pam	Thür. Kunstfaserfabrik 'Wilhelm Pieck' Schwarza, E. German

Name	Base material or process	Company
Trevira	Pe	Farbwerke Hoechst AG
Tricel	CA	British Celanese, London
Trilan	CA	Canadian Celanese, Drummondville
Tubize	CV	Fabelta-Tubize, Belgium
Tufton	CV	Am. Viscose Corp.
Tygan	Mp	Lus-Trus Extruded Plastics Inc., Ann Arbor
Tynex,	Pam	E. I. Du Pont de Nemours & Co., Wilmington
Typel	CA	Courtaulds Ltd., London
Velon	Mp	Firestone Plastics Co., Pottstone
Vestan	Pvc	Chemische Werke, Hüls
Vicara	Pr	Virginia Carolina Chemical Corp., Taftville
Vinylon	Pva	Mitsubishi Tayon Co., Otake, Japan
Vinyon	Mp	Union Carbide Corp., South Charleston
Vinyon HH	Mp	Am. Viscose Corp.
Vinyon N	Mp	Union Carbide Corp. Chemicals Corp., South Charleston
Virion	CV	SNIA Viscosa, Milan
Vistra	CV	Kunstseidewerk Fr. Engels, Premnitz, E. Germany
Wolacryl	Pa	Film- und Chemiefaserwerke Agfa, Wolfen, E. Germany
Wolcrylon	Pa	Film- und Chemiefaserwerke Agfa, Wolfen, E. Germany
Woolon	Mp	Japanese Synthetic Fibre Co., Japan
Wynene	Pae	The National Plastic Corp. Products, Odenton, US
Zehla	CV	Spinnstoff-Fabrik Zehlendorf AG, Berlin-Zehlendorf
Zetek	Mp	B. F. Goodrich Chemical Comp., Avon Lake
Zycon	Pr	Virginia Carolina Chem. Corp., Taftville

France's Stringent Regulations for Fabric Non-Flame Tests

DEVELOPMENTS in the application of man-made and synthetic fibres to carpet production was the subject of a one-day conference organised by the Federation of British Carpet Manufacturers, and held at the British Rayon Research Association, Heald Green Laboratories, Wythenshawe, Manchester, on 13 November.

Papers presented were: 'Production and use of man-made fibre yarns for carpets' (a joint paper by Courtaulds and British Celanese); speakers were H. Sneyd (Courtaulds Ltd., Arrow Mill, Rochdale), J. A. Kirby (Courtaulds, Coventry), and R. C. Cheetham (Courtaulds, Droylsden, Manchester). 'The physical properties of tufted carpets made from blends of viscose and nylon 6.6', by C. H. S. Sturley (British Nylon Spinners Ltd., Pontypool); 'The use of vinylic fibres in the carpet industry', by C. Froger (Société Rhovyl, Tronville-en-Barrois, France).

In his paper Froger mentioned two characteristic and distinct properties which made the pure p.v.c. fibres manufactured by the Société Rhovyl, of particular value for the carpet industry; their complete non-inflammability; and their capacity for shrinking possessed by certain types of their fibres and continuous filament yarns.

Fibravyl is a staple fibre with a high tensile strength of the order of 3 gr/den. which has the ability to shrink in its loose state 55 per cent, at temperatures above 75°C. Thermovyl is also a staple fibre which has, however, been heat stabilised by treatment at boiling temperature. Its shrinkage is therefore nil at 100°C. Its tensile strength is only approximately 1 gram/den. Its appearance is less lustrous and it very much resembles pure wool.

The regulations in force in France for official non-flame tests differed considerably from those specified in the UK and the US. In the latter two countries one measured, on a specimen sample, the speed at which a flame propagated itself, while the French regulations stipulated that the fabric should not propagate and assist the fire at all but should, in fact, resist its spreading.

It is therefore necessary to make a proper, extended combustion test and to assess the resulting destruction of the fabric. The test should consist of submitting a sample of the material in question, measuring 28 cm. by 21 cm. (7 in. by 4 in.), and fixed by pins on a frame, to combustion by an alcohol flame for three minutes.

A textile material is described as 'non-inflammable' when, after extinguishing the alcohol flame, it will not show:—

(a) any flame immediately after;

(b) any after-glow at any point after 10 secs.;

(c) any fumes after 30 secs.;

(d) the carbonisation zone, after complete cooling of the sample, will not exceed an average surface area of 60 sq. cm. (this being approximately 10 per cent of the original size of the pattern)

A textile material is classed as 'hard to inflame' or 'not very inflammable' if:—

(a) 5 seconds after extinction of the alcohol flame, it will not show any flame.

(b) there are still ignition points which will only spread to already carbonised areas, but will not affect the unburned zones.

(c) the zone of carbonisation after cooling, does not reach—under any circumstances—the upper border, and has an average surface area below 100 sq. cm.

L. to r. at the conference: R. C. Cheetham, Courtaulds Ltd., C. P. Atkinson, Mather and Platt Ltd., H. Sneyd, and J. A. Kirby, Courtaulds

Letter To The Editor

Reductions in US Sulphur Prices

Sir,

It is apparent that some publications, both here and abroad, received incomplete information regarding the reductions in sulphur price schedules which occurred in September. For example, the article in CHEMICAL AGE, 19 October, p. 652, indicated that the new US prices for sulphur exported are higher than those for domestic shipments.

What happened was this: on 17 September, Texas Gulf Sulphur Company reduced its prices by $3 per long ton for bright sulphur, and $2.50 per ton for dark sulphur for customers in the United States and Canada. Freeport then made an across-the-board reduction of $3 per ton for all customers, domestic and export. Texas Gulf consequently met Freeport's broader reductions, as did other US producers.

The quoted US prices f.o.b. port, for both domestic and export sales, are now $25 per ton for bright sulphur and $24 per ton for dark sulphur. The prices f.o.b. mine are $1.50 per ton less, a differential which has been in effect for many years and which has roughly represented the average cost of bringing the sulphur from mine to port.

Yours, etc.

J. C. CARRINGTON
Vice-President

Freeport Sulphur Co.
NewYork 17, NY.

BISRA Describe Three Methods of Sulphur Removal

THREE methods of removing sulphur from iron and steel are described in the *Survey* for 1957 published by the British Iron and Steel Research Association. Attempts have been made to reduce the sulphur entering the blast furnace by increasing the amount removed during sintering. It has been found possible to remove over 90 per cent of the sulphur compared with the 70 to 80 per cent achieved in normal practice.

Practice at the Steel Co. of Wales has shown that low sulphur low silicon iron can be produced by using highly basic slags. Slag composition is calculated from a series of diagrams recently published in the US which show slag composition for different alumina contents over the range of 0.35 per cent in five per cent steps. The validity of these diagrams has been confirmed by work carried out at the blast furnace laboratory, Imperial College, London.

The French research organisation IRSID has developed a process for sulphur reduction using lime. A form of converter containing the hot metal is bottom-blown with a blast of air or nitrogen-carrying powdered lime in suspension. This method is claimed to reduce the sulphur content from 0.1 per cent to 0.003 per cent within five minutes. The process is to be used commercially on a 1,000 tons a day plant in France.

BISRA is collaborating with the British Iron and Steel Federation's air and river pollution committee. A more accurate picture has been obtained of the changes in flue gas pollution which occur during the melting and refining cycle, and between one melt and another. A simple apparatus, which will shortly be marketed, has been designed, with which the degree of pollution can be determined in about 10 mniutes.

The use of oxygen in steelmaking results in the formation of a reddish oxide fume which is as fine as tobacco smoke, and is therefore difficult to remove, Pilot plant investigations are proceeding at the Battersea laboratories in the hope of improving wet scrubbing methods. In several cases the use of oxygen/steam blast in place of the all-oxygen blast has been found to reduce fuming to tolerable proportions.

Research sponsored by BISRA and other associations representing the non-ferrous metals, cast iron and welding industries, has resulted in the development of an apparatus which will determine the composition of an area of steel as small as a micron in diameter. The method is based on the Castaing technique and the apparatus has three main parts: an electron optical system for producing a high intensity beam, an X-ray spectrometer and detector and an optical system for viewing the irradiated area.

Makers of the instrument are Metropolitan-Vickers Electrical Co. Further information on the technique can be obtained from BISRA's London headquarters, 11 Park Lane, London W1.

UK Underground Gasification Team will Inspect Soviet Work

A FIVE-MAN team left by air for Moscow on 17 November to study progress made by the Russians on underground gasification of coal. They will spend about two weeks in the Soviet Union and next March a party of Soviet experts will visit this country.

The team will comprise: Mr. J. Norval, chairman, underground gasification executive, National Coal Board; Mr. W. M. Noble, deputy production director, East Midlands division, NCB; Dr. A. E. Balfour, deputy head of underground gasification, Humphreys and Glasgow Ltd., who are responsible for the Newman Spinney project on behalf of the board; Mr. J. H. Lander, partner of Sir Alexander Gibb and Partners, the board's Newman Spinney consultants; and Mr. F. E. Warner, Cremer and Warner, consulting chemical engineers, who are also consultants on the project.

Dr. A. E. Balfour, deputy head of underground gasification, with Humphreys and Glasgow

Dr. Balfour stated that the Russians had been working on underground gasification since 1935, latterly on a large scale. The team hopes, among other things, to learn about Soviet work on the use of oxygen which offers the possibility of producing gas of higher calorific value than can be obtained by using air; gas which might be suitable for use in town gas or for synthetic purposes.

There is an underground Gasification Research Institute in Moscow and at Stalino an Underground Gasification Design Institute. Dr. Balfour added that although UK work was concentrated on bituminous coal, the team would be interested to see Soviet progress with brown coal because of the extensive deposits of brown coal in the Commonwealth and Europe.

FBI Grand Council Approves Free Trade Plan

A FOUR-POINT resolution in favour of the Government policy on European free trade, subject to certain provisions, was carried by a large majority of the grand council of the Federation of British Industries last week.

Firstly, it considered that the safeguards and conditions set out in the joint report published in September 1957 by the Association of British Chambers of Commerce, the FBI and the National Union of Manufacturers, were essential to the interests of UK industry; secondly, it was thought essential that the clauses in the convention dealing with definition of origin must provide for either or both the percentage content and the process method to be available at the choice of the industries concerned.

Thirdly, it was felt essential that existing UK anti-dumping laws should be strengthened and that the other contracting Governments should equally provide adequate measures to prevent dumping; fourthly, the grand council welcomed the undertaking of the President of the Board of Trade that he would consult the FBI in the course of negotiations in the event of any material change developing in the safeguards or conditions set out in the joint report.

Soil Stabilisation Development Work

WORK on the use of Arquad 2HT-75% for soil stabilisation is in the development stage. It has been tried out in road building and has been tested successfully in desert conditions for stabilising sand.

The principle of the method is that the Arquad, which is a cationic chemical made by the chemical division of Armour and Co., GPO Box 250, Lindsey Street, Smithfield, London EC1, forms a chemical compound with oppositely charged sand or clay. The soil is first pulverised and then the material is sprayed on, the soil is pulverised again and then rolled, forming a hard, water-resistant layer.

Compared with the use of cement, the Arquad method is believed to be about 20 per cent cheaper and to be of use in conditions where cement is not suitable.

This and other uses of Arquads are described in an Armour brochure.

Important applications at this time are for water softening in laundries and for cationic road emulsions which were used in this country for the first time this summer, having been established on the Continent for the past three years.

Another important application described is corrosion inhibiting in oil pipelines. It is claimed that the use of Arquad S-50% will increase the life of a pipeline from two years to about 80 years.

Hydrogen Sulphide Determination

The hydrogen sulphide determination apparatus described on page 811 of our last week's issue was as stated designed and developed at the Brentford laboratory of the North Thames Gas Board, but not by C. A. Hendley. Mr. Hendley is manufacturing the apparatus to the designs prepared in the board's laboratories.

Overseas News

SUBSTANTIAL INCREASES IN CANADIAN CHEMICAL SALES PREDICTED

PREDICTIONS made by the Royal Commission on Canada's economic prospects suggest that by 1980 chemical sales in Canada will be between $5,000 million and $8,000 million. Sales in 1955 were about $1,250 million. The commission stress that the chemical industry has been growing more rapidly than any other major industrial group in North America—9 per cent a year compared with 6 per cent a year. Reasons for this expansion are: (1) Replacement markets in which synthetic materials are replacing materials of natural origin; and (2) new markets in which medicinals, insecticides and new chemical fertilisers were being sold in fields in which no equivalent product existed previously.

It is predicted that the new market will expand indefinitely but that the replacement field will begin to slow down.

Sales of synthetic fibres, such as nylon, Orlon, and Dacron would occupy the entire textile field by 1970 if they continued at the same rate. A tapering-off during the next 10 to 20 years is bound to occur.

Similarly, detergents at present sales rates would replace soaps completely in the next 10 years, a phenomenon which is not expected by the commission.

In the case of synthetic rubber, the report predicts that only strategic reasons would entirely eliminate competition from Far East plantations. There was no foreseeable ceiling for plastics and even wood seemed to be losing to them.

The sales future for medical chemicals and fertilisers appeared unlimited and a remarkable future for silicones as heat-resistant materials and for fluorocarbons as refrigerants and lubricants was predicted.

The commission's predictions of percentage annual growth rates for specific chemicals for 1952-60 are as follows:

Plastics	14	Synthetic insecticides	8
Medicinals	12	Solvents	7
Anti-knock agents	9	Synthetic rubber	7
Fibres	9	Dyes	6
Surface active agents	8	Fertilisers	5

It is predicted that by 1960 the big chemical markets will be: Basic industry, $973 million; agricultural chemicals, $572 million; the food industry, $453 million; textiles, $466 million; and the rubber industry, $270 million.

The report says that expansion of the Canadian chemical industry will be limited as long as US tariff barriers hamper Canadian chemical exports to that country, and while US chemical producers consider Canada a convenient place in which to dispose of such surpluses as occur from over-expansion and the fluctuations of the US economy.

Kaolin Catalysts for Oil Refineries

Now being produced by Minerals and Chemicals Corporation, US, and marketed by Houdry Process Corp., is a pelleted kaolin catalyst. The material is described as suitable for use in moving-bed reactors.

Minerals and Chemicals have a 100-ton-a-day plant at Attapulgus. The company claim that their catalyst performs as well as synthetics, but costs less than two-thirds as much. The competitive catalysts are based on bentonite or halloysite (naturally occurring aluminium silicates) or made synthetically.

The company are expecting to put a fluid (non-pelleted) kaolin catalyst on the market at an early date.

Gas Pipeline at Venezuelan Refinery

At the new Venezuelan oil refinery at Cardon a 180-mile long 20-in. high pressure gas line has been completed, starting from the La Paz-Concepción area west of the town of Maracaibo. This enables natural gas to be used for the operation of the refinery, replacing the liquid fuel previously used for this purpose and making it available for sale.

Polyvinyl Alcohol Fibre Details Released

Some details of Kuralon, the trade name for vinylon, a fibre produced from polyvinyl alcohol, have been given by the Kurashiki Rayon Co. Ltd., Osaka, Japan. Polyvinyl alcohol was first produced in Germany in 1924 by Dr. W. O. Herrmann and Dr. W. Haehnel who seven years later succeeded in producing polyvinyl alcohol fibre by wet or dry spinning.

Japan in 1939 produced a highly water-resistant synthetic fibre from polyvinyl alcohol. A pilot plant was constructed in 1948 and two years later the Toyama plant for the production of polyvinyl alcohol and the Okayama plant for the production of vinylon fibre were constructed.

Good abrasion, fire and chemical resistant properties are claimed for Kuralon. It is said to be stable to acids, alkalis, neutral salt solutions and many organic materials.

New Process for Nitric Acid

The French Kuhlmann concern have a new type absorption-oxidation process for the production of nitric acid. The new process came into production at the company's Madeleine plant in September. It utilises 50 tons of ammonia daily. In due course Kuhlmann intend to grant foreign licences.

French Currency Manipulations May Affect US Sulphur Sales

No immediate effects on relations between the French and US chemical industries are expected as a result of the latest development in French currency manipulations. According to *Chem. and Engng. News*, 1957, **35**, No. 45, 32, the most likely US chemical commodity to be affected is sulphur.

France's average sulphur consumption is about 250,000 long tons a year, some 200,000 tons of which is imported. In 1956, the US sold 147,000 tons to France and 66,000 tons in the first six months of this year. Mexico last year sent 60,000 tons and 37,000 tons in the first half of this year. US opinion is that French sulphur users have large stocks in hand. Also they are likely to turn to pyrites from Spain as sulphuric acid producers in France can use either elemental sulphur or pyrites. Another factor which is considered likely to affect US sulphur sales to France is France's own domestic production of sulphur which is expected to rise from 50,000 to 300,000 tons a year because of the development of the Lacq gas fields.

New Canadian Atom Plant

At the beginning of this month the NRU $57 million atomic research reactor began operating. Set up by Atomic Energy of Canada Ltd., this reactor will produce significant quantities of plutonium.

Built as a triple purpose reactor, it will be used for research and experiments in development of electricity-producing nuclear power stations, for production of plutonium and for manufacturing a wide variety of radioactive isotopes.

Uranium from Klerksdorp Consolidated

Mention is made in the annual report of Klerksdorp Consolidated of the occurrence of uranium in a narrow width. Sorting, using both visual and electronic methods, has proved successful, it is reported. The company expect that when a treatment plant is designed a comparatively high rate of uranium production from a small tonnage of selected ore will be possible.

Potassium Salts Bed Found

A potassium salts bed has been discovered at Milena, province of Caltanisetta, Sicily. It is reported to be as rich as the one discovered previously at Serradifalco, province of Enna.

Plan for Cellulose Production

Experiments with plant residues for cellulose production have led to a plan for production by the American Israel Paper Works, Hadera, Israel, of some 15,000 tons of cellulose a year from corn stubble, reports the Israel Ministry of Agriculture.

Peroxides by British Process

In 1956, Air Liquide and Ugine formed a joint venture Soc. Oxysynthèse to produce hydrogen peroxide by the tried process of Laporte Chemicals Ltd. In order to hasten the project initial capital of 100 million francs has been raised out of the required 750 million francs.

Water Purification Plant Export Planned

Plans to export water purification equipment to markets in Asia, the Pacific and the Near East are being made by Sulphates Ltd., Springvale, Victoria, Australia, together with their subsidiary, Filtration and Water Softening Pty. Ltd. Overseas agents

are being appointed to distribute the equipment.

Sulphates Ltd. make aluminium sulphates and alums which are used in water purification plants. These plants, together with chlorinators and trade waste treatment units, have been installed in many Australian towns and cities.

Hoechst Build Petrochemical Plant at Gendorf

A petrochemical plant is now being built by Farbwerke Hoechst AG at their branch works at Gendorf, on the Alz river in Upper Bavaria. The plant will be started next spring and is to use a new cracking process operating at medium temperatures on the basis of light oils.

The works at Gendorf were erected in 1939, taken over by Anorgana GmbH, an IG Farben subsidiary, in 1941, acquired by the Bavarian Government in 1953 and sold to Farbwerke Hoechst AG in 1955. The production programme now includes ethylene oxide and glycol, other glycols and derivatives, detergents, emulsifiers, lacquers, anti-freezing compounds, textile and agricultural chemicals, polyvinyl chloride, polypropylene and other plastics.

The new plant will provide an alternative source for ethylene oxide and glycol. A natural gas deposit discovered near Gendorf is expected to provide a basis for methane chlorination products.

Jefferson Lake to Build Pacific Coast Sulphur Plant

Jefferson Lake Sulphur Co's new $2,500,000 plant at Taylor, in north-eastern British Columbia, will initially produce 100,000 tons of sulphur a year. Freight saving to Pacific north-west users of sulphur will, it is said, total $1,750,000 a year.

Indian Standard on Coal Tar Disinfectant

An Indian standard specification has now been published for coal tar disinfectant fluids, black and white.

Coal tar disinfectants are now being produced in considerable quantities in India. This standard does not include soluble type of coal tar disinfectants, such as Liq. Cresol Sap (Saponified Cresol) included in the Indian Pharmacopoeia.

It is expected that the requirements prescribed in this standard will ensure the supply of disinfectants of good commercial quality to the consumer and also enable the manufacturers to produce material of acceptable quality.

Fertiliser and Synthetic Fibre Plants for Mexico

Nacional Financiera is to give its support to the plan for the erection of a fertiliser plant in the Tehuantepec region. Investment will be of the order of 136 million pesos. Daily output of the plant is to be 130 tons of triple superphosphate and 100 tons of simple superphosphate. Guanos y Fertilizantes are to direct the plant. A plant to produce 150 tons of superphosphate daily is being erected at Andad Madero and another project envisages the establishment of a fertiliser plant at Salamanca.

The new plant of Viscosa de Chihuahua, SA, at Anahuac, Chihuahua, has been inaugurated. It will produce synthetic fibres, utilising mainly national sources for its raw materials. Daily production capacity of the plant is 10,000 kilos of short fibre for use with wool or cotton. The Ballina-Trouzet group have financed this plant.

Nitrogenous Fertilisers in India

India's requirements of nitrogenous fertilisers in the country during the calendar year 1956 were 655,500 long tons. Of this amount 388,990 long tons had been produced locally. The country's requirements in terms of sulphate of ammonia, urea and ammonium nitrate last year were 613,000 long tons, 24,600 long tons and 17,900 long tons respectively.

Dutch Soda Developments

The Delfzijl soda factory which is a joint enterprise of the Dutch Government, the State mines, the Royal Netherlands Salt Industry and a number of chemical industries, is to begin production by the end of this year. The factory will be in full production by March-April.

BASF Sales Increase

BASF (Badische Anilin und Soda Fabrik AG) sales during the first seven months of 1957 were higher in quantity and value than during the corresponding months of 1956. Past investments resulted in an increase of production, and the market situation made it possible to dispose of the increased production in nearly every field. In some branches, particularly that of plastic raw materials, demand is still increasing faster than output. The company is extending its production plant to meet this development.

Germany's Five-Year Nuclear Power Plan

West Germany has outlined a five-year plan for the development of nuclear power reactors. The programme is in addition to the research and material testing reactors to be delivered by Britain and the US.

The Atomics Minister, Dr. Balke, announced last week that within the next five years, four or five reactors with a total capacity of 500 MW are to be built at a cost of £83 million, in close co-operation with foreign concerns. The 1,500 mgw. programme announced early this year will come later.

Financing the programme is understood to be difficult. The only order so far placed has been by a group of seven municipal power plants with Krupp-Brown-Boveri for a 15-MW experimental unit. The order for the AFM-Mitchell reactor has recently been cancelled.

Australia's First Nuclear Graphite

Nuclear grade graphite has been successfully machined and assembled in Australia for the first time. More than 800 blocks of graphite, weighing 30 tons, have been fitted together to form around the inner reactor tank of Hifar, Australia's first nuclear reactor.

According to Senator W. H. Spooner, Minister for National Development, the task had been completed in less than the scheduled time.

Isotopes for Australian Agricultural Research

A new atomic reactor now being installed at Lucas Heights, near Sydney, NSW, is expected to be producing next year a range of radioisotopes for agricultural research workers. They will be used as tracers, in photosynthesis, labelling of insecticides and weedkillers, and in research on meat preservation.

Interkama Exhibition Attracts 80,000 Visitors

An attendance of 80,000 trade buyers and specialists was reported at the Interkama, international congress and exhibition of measuring instruments and automation, held at Dusseldorf, Western Germany, from 2 to 10 November.

Fifty per cent of the visitors came from foreign countries and 3,000 scientists and engineers from 65 countries took part in the congress and technical sessions.

Air Liquide to Produce Low- and High-pressure Polythene

THE FRENCH Air Liquide group of Paris has established chemical interests which include Comp. Française de Produits Oxygènes, Soc. Lyonnaise Industrielle Pharmaceutique, Soc. Chimique de la Grande Paroisse and the Belgium company, Soc. Belge de l'Azote et des Produits Chimiques du Marly.

Air Liquide have assured themselves of ethylene supplies from the petroleum refinery of Esso Standard at Port-Jerome (Seine-Maritime), and the company has been negotiating with Imperial Chemical Industries and with Professor Ziegler for licences to manufacture polythene by both the high (ICI) and low (Ziegler) processes. These licences have now been granted and Air Liquide have set up two subsidiaries to produce these polythenes.

Soc. Normande de Matières Plastiques (capital Fr.200 million) will produce low pressure polythene by the Ziegler process. This is a 50-50 venture between Air Liquide and Soc. Huiles, Goudrons et Dérivés. Houillères du Bassin du Nord et du Pas-de-Calais will make 'know-how' available.

Soc. Ethylène Plastique Normandie (capital Fr.600 million) formed by Air Liquide, Ethylène Plastique, Huiles, Goudrons et Dérivés, as well as Pechiney, will produce the ICI product.

Air Liquide group acquired interests in Soc. Ethylène Plastique and Soc. Chimiques des Dérivés du Pétrole, Petrochim. This last named company is at present building a petrochemical plant in Antwerp, Belgium.

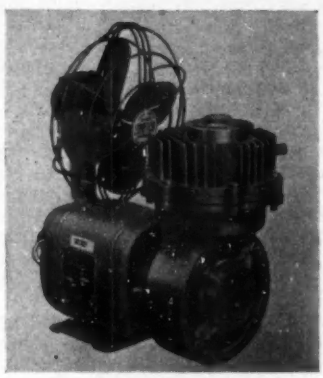
EQUIPMENT REVIEW

Chemical Plant: Laboratory Apparatus: Safety and Anti-Corrosion Products

OIL-FREE AIR COMPRESSOR

LATEST development in the range of diaphragm air compressors made by Dawson McDonald and Dawson Ltd., Compton Works, Ashbourne, is the Compton D-type series 3 with fan cooling. A significant reduction is claimed in running temperature and, consequently, greatly increased diaphragm life. The machine is recommended for continuous duty at pressures up to 40 p.s.i. or for intermittent duties at higher pressures.

Grease-packed and sealed ball bearings make for smooth running and allow the machine to be mounted in any position. An inlet filter is fitted as standard, unless



Diaphragm air compressor

the compressor is required for vacuum duties. Also standard is an adjustable relief valve. A built-in surge chamber smooths out the pulsations and ensures a steady air flow.

INDELIBLE MARKING FOR INDUSTRY

PERMANENT marking of almost any surface or material is claimed for a new type of ball-point colour tube. Tri Chem, distributed by Cepea Developments Ltd., St. James's Buildings, Oxford Street, Manchester 1, is available in 15 colours in the 5s size and 11 in the 3s 6d 'Cadet' size.

This special type of paint, contained in an orthodox metal tube, is applied direct on to the surface through a spring-loaded ball-point nozzle. On absorbent surfaces, the paint dries almost immediately and on hard shiny surfaces in a few seconds. The paint is said to withstand considerable extremes of temperature and many acids, alkalis and oils, and is not affected by weather, moisture or grease. It is considered suitable for marking parts for assembly, marking laboratory glass, identification of materials throughout a series of processes, stock and quality control, sales and progress charts.

CHEMICALLY INERT PAPERS

AMONG four new papers announced by William Palfrey Ltd., Palfrey House, 24 City Road, London EC1, is a range of chemically inert papers known as Seven 0 sized neutral papers. Developed in association with the US Navy for use in contact with metals, they are said to have no corrosive effect on ferrous and on many non-ferrous metals. They are said to be particularly suitable for use with steel, copper, tungsten, aluminium, nickel, silver, brass, manganese, zinc and cadmium.

Another new line, a mould-resistant paper known as Nevermold 101, is the result of more than six years' research and trials. No fungal deterioration was revealed after 14 days on both dextrose media and dextrose free media, with chaetomium globosum, aspergillus terreus and aspergillus niger. It is also stated that soil burial tests for periods up to 30 days indicated no significant loss in tensile strength and that the paper's fungicidal efficiency was not impaired after leaching in running water for 24 hours, exposure in a weatherometer for 100 hours and heating in an oven at 180°F. for 48 hours.

The product is approved for intimate skin contact. Uses suggested are for bagging soil and ore samples, fertilisers, peat moss, etc., and for use in sheet form as a base paper for polythene coating.

Two other new papers are a flame-resistant paper and Scrimtex, which incorporates a fibre-glass or rayon reinforcing scrim built into the paper during manufacture. Scrimtex has been used in packaging molten resins at temperatures of up to 425°F.

FERMENTER SETS FOR MICROBIOLOGY

LABORATORY fermenter sets for chemical microbiological work are now being manufactured by Taylor Rustless Fittings Co. Ltd., Ring Road, Lower Wortley, Leeds 12. Multiples of two fermenters are suspended in a bath of water heated by immersion heaters and circulated by a pump. Each pair of fermenters is driven by an electric motor through V-belts carried on a frame above the fermenter. Five speeds between 300 and 1,500 r.p.m. are available.

Individual vessels are 7½ in. by 15 in. deep in stainless steel, or 9 in. diameter by 18 in. deep in glass. All parts of the fermenter in contact with the fluid or with additives are of stainless steel or glass.

Branches in the removable header plate include the following, some of which may be omitted or additional ones provided: air inlet and outlet, an electrode branch, injection boss for the admission of small quantities of additives, addition vessels for larger quantities, thermo branch, pressure equaliser to equalise the air pressure behind the solution in the addition vessel with that in the fermenter, sampler, baffles, bearing assembly, and propeller.

The design of the fermenters is based on a specification in the 1954 English edition of the *Rendiconti del Instituto Superiore di Sanita*. The company state that other fermenter vessels described in this journal can be made by them.

FLAMEPROOF FORK TRUCK

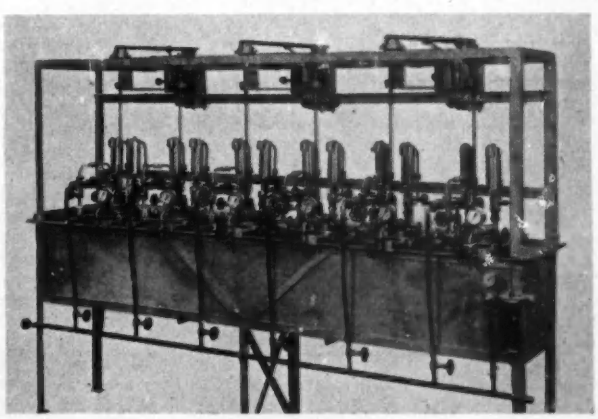
BUILT to Buxton requirements, the new flameproof electric fork truck is designed for operation in fire-hazard areas. This has been achieved without loss of manoevrability as the outer turning radius of 77 in. is only 4 in. greater than with the standard model.

Ventilation of the battery is based on Ministry of Power test memorandum 11 and Safety in Mines Research Establishment report 122. External wiring between electrical components consists of mineral-insulated, copper-clad cables made adaptable to conduit entry by means of screwed flameproof glands which house the sealing termination.

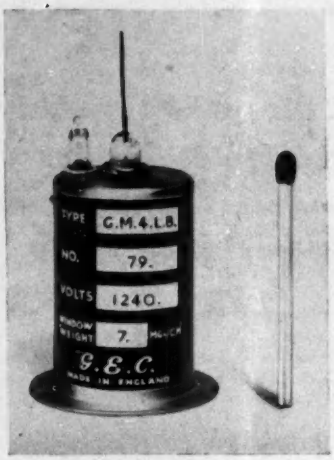
Capacity of the truck is 4,000 lb. at 20 in. load centre; a 4,500 lb. version will also be available. It is made by Conveyancer Fork Trucks Ltd., Liverpool Road, Warrington, Lancs.

GEIGER COUNTER TUBE

A NEW Geiger counter tube, type GM4LB, with a low rate of count in the absence of the test specimen has been developed by The General Electric Co. Ltd., Magnet House, Kingsway, London WC2, for the



Laboratory fermenter set by Taylor Rustless Fittings



Geiger counter tube

measurement of minute amounts of radioactivity.

Specially designed for this purpose, it has a thin duralumin window 1 in. in diameter to admit particles from the specimen. The length of the anode wire has been kept to a minimum to reduce the response to any extraneous radiation and the materials used in the construction have been selected as free from radioactive contaminants such as potassium and lead which might contribute to the background count.

In order to obtain the minimum background response, the tube must be operated in a heavily-shielded enclosure and surrounded by a ring of gamma counters. This arrangement is called an anti-coincidence network and ensures that stray radiation from outside which passes through this ring is not recorded by the measurement tube. The company state that background responses as low as 0.4 counts per minute have been obtained with this network, enabling specimens with an extremely low activity to be measured.

Also new from GEC are two new non-corrodible lighting fittings, that have been specially designed for use where corrosive vapours are present. The fittings, which incorporate a new method of suspension, are largely of plastics construction and have no external metalwork. The reflector of each fitting is formed in 068 opal Perspex and is sealed into a front cover of clear 'pin-spot' Perspex. The combination of finishes ensures an adequate upward illumination, while the maximum light output is directed downwards. The top cover is of dense opal Perspex which clamps tightly on to a sponge neoprene gasket fixed to the main reflector body.

Each fitting is suspended by three independent Terylene cords. The suspension cords are secured to ceiling plates of ¼ in. thick p.v.c. with fixings at 2 in. centres.

GAS REFRIGERATING MACHINE

PHILIPS ELECTRICAL LTD., Shaftesbury Avenue, London WC2, have produced their gas refrigerating machine, a new version of the PW 7000.

It is a compact, electrically driven, single-cylinder unit, which can, it is claimed, produce five litres of liquid air or liquid nitrogen an hour within 15 minutes of starting up. Gas to be liquefied does not undergo compression or pass through any working parts and the machine will produce liquid gas from those gases which liquefy at above —200°C. Temperatures of —80°C to —200°C can be achieved in a single stage. Under normal conditions the machine requires an hour for defrosting and draining of the freezer after 16-20 hours production. Moisture and carbon dioxide are removed by freezing.

Among the processes in which the machine can be used as ancillary equipment are the cold machining of plastics, artificial ageing of steel in accelerated tests, cold shrinking, low temperature annealing, hardening of steel, storage, etc. It can also be used for low temperature research in physics, engineering, chemistry, biology and pharmacology.

AIR LINE LUBRICATION

TELEKTRON (Great Britain) Ltd., Jermyn Street, London SW1, have developed an oil mist lubricator incorporating a novel filling method, and with operating characteristics considered suitable for use in air line systems which are subject to intermittent flow.

An initial burst of rich oil-air mixture occurs on the first flow through the lubricator, and thereafter the oil content of the mixture is reduced and maintained at a level proportional to the flow. Although it is suitable for use on constant flow its characteristics are best considered to be suited to intermittent air flow requirements such as

Oil mist lubricator

the automatic and remote control of motorised valves fitted with an air motor or cylinder units.

Peg mounting from bracket, wall, or cable tray is provided. The distance from the wall is adjustable enabling a group of lubricators to be mounted close together by allowing the pipes in and out of each lubricator to pass behind the others. They are also suitable for panel mounting and designed so that the bowls may partially protrude through a 'cut-out' in the panel enabling the filling cap to be exposed. With this arrangement the oil level may be viewed from all angles and the lubricator refilled from outside the panel. The lubricators are suitable for air pressures up to 150 p.s.i. with flow in either direction, and are supplied with ¼in. b.s.p. ports for use with standard taper or parallel stud couplings. They are in production and available for immediate delivery.

FIELDEN OPERATION RECORDER

FIELDEN ELECTRONICS LTD., Wythenshawe, Manchester, have developed an operation recorder which can provide a permanent and visible record of operations and events. Originally designed to record the times at which chimneys emit excessive smoke the instrument has since been found satisfactory for registering the on/off times of machines or electrical circuits, for showing the rate at which items are being produced in a repetitive process and for recording the times when vehicles are in a particular area. When used for recording production the instrument can be complementary to a counter.

Two charts are available for the operation recorder, a 24-hour and a seven-day chart. An inkless pen, consisting of a heated stylus, draws an indelible trace upon heat sensitive paper. The pen is energised from a low voltage source and has a power consumption of under one watt.

A pair of contacts make when it is required to produce a trace on the recorder; when they are closed and the stylus heated, a black line approximately $\frac{1}{32}$in. wide is produced. During the off periods a lower voltage is applied to the pen, producing a faint, thin line on the chart. The difference between these lines is very clearly visible but the thin line does enable the trace to be followed even though no operations have been recorded.

The single point model is priced at £29 17s 6d and multi-point recorders are also available.

PROXIMITY SWITCH FOR CONVEYORS

A PROXIMITY switch for use on conveyor belts is being produced by Burndept Ltd., West Street, Erith, Kent. Suitable for use with a wide range of ferrous or non-ferrous, conductive or non-conductive materials or liquids, it operates without physical contact, depending on the change in capacity caused by objects passing the sensing probe situated at one side of the conveyor.

The switch will operate with objects which are touching and so, the company consider, will function where photo electrical cell devices fail through lack of space between the objects to permit the light sources to be operated. It can also be used with a suitable probe for level control. All the electronics and the power supply are housed in a case 8 in. by 2¾ in. by 6 in., and weighing 10 lb.

Plastics Record Likely This Year

UK PLASTICS industry output should reach a new record level of over 400,000 tons, ten times the output in 1947. This statement was made by Mr. David Radford, chairman of British Plastics Federation publicity committee at an Amsterdam preview of the International Macroplastic Fair which opened last week until the 20 November.

The value of the estimated 100,000 tons output would be about £100 million. Exports of raw materials only by the plastics industry in the first six months of this year totalled 52,500 tons compared with 98,000 tons for the whole of 1956.

PEOPLE in the news

● MR. G. F. BASSETT, managing director of Ashdown's Ltd., the plastics subsidiary of Pilkington Brothers Ltd., has been appointed to the board of Reed Milligan and Co., Ltd., Newcastle upon Tyne, and will become managing director early next year. He joined Pilkingtons as assistant secretary in 1933 and became managing director of Ashdowns in 1942. MR. J. TOUGH, Ashdown's sales manager, has been appointed general manager of the new Chance-Pilkington optical glass works, St. Asaph. Ashdown's Ltd. are due to close down at the end of the year.

● The Senate of Durham University have conferred the title of Professor Emeritus upon P. L. ROBINSON, Personal Professor of Inorganic Chemistry in the Newcastle division from 1956 to 1957.

● MR. J. A. BAKER, senior research officer, division of industrial chemistry, Commonwealth Scientific and Industrial Research Organisation, Australia, is due in the UK this month to take up a senior visiting fellowship for one year at Bristol University. MR. C. B. GRESFORD, research secretary, physical sciences, CSIRO, has this month been visiting UK scientific institutions. A third Australian scientist now in the UK is DR. M. LIPSON, officer-in-charge at the Geelong Wool Textile Research Laboratories, who is visiting research centres in the UK and on the Continent.

● AIR COMMODORE SIR ARTHUR VERE HARVEY, C.B.E., M.P., has accepted the chairmanship of the boards of Aero Research Ltd., Duxford, Cambridge, and Ciba Ltd., Horsham. In this appointment he succeeds SIR RAYMOND NEEDHAM, Q.C., who has been chairman since 1947 and who remains a director of both companies. Sir Arthur served in the RAF from 1925 to 1930 and formed 615 County of Surrey Squadron, which he commanded in France in 1939–40. Since 1945, he has been M.P. for Macclesfield and has served as chairman of the Conservative Parliamentary air sub-committee and of the Conservative Party civil aviation committee. His industrial appointments include directorships of Carters Tested Seeds Ltd. (chairman), Mullard Ltd., Handley Page Ltd. (deputy chairman), and Philips Electrical Ltd.

Sir Arthur Harvey

● MR. D. B. BENEDICT, a new vice-president of Union Carbide Corporation, US, has been president of Union Carbide Chemicals Co., division of the corporation. In his new position he will be responsible for the corporation's chemicals and plastics activities. MR. E. E. FOGLE has been appointed president of Union Carbide Chemicals Co. MR. H. D. KINSEY is president of the newly formed Union Carbide Olefins Co. The Olefins Co. will handle the production and sale of ethylene, propylene, butadiene, and other hydrocarbon products.

● MR. OLIVER GREGORY, export sales manager of Griffin and George Ltd., scientific instrument manufacturers and laboratory furnishers, Alperton, Middx, left London Airport recently for a six weeks' business trip to the Middle East countries. He is visiting Tripoli, Khartoum, Baghdad and Teheran and will return by way of Milan and Paris.

● MR. W. D. BURNET has been appointed a director of the Distillers Company.

● MR. C. D. O'Sullivan has been re-appointed president of the Society of British Paint Manufacturers, and MR. T. S. DALLY vice-president for the year 1957–58.

● SIR KENNETH B. HARPER has retired from the board of the British Petroleum Co. MR. ROBERT P. SMITH has been appointed to fill the vacancy.

● DR. M. W. GOLDBLATT, who founded in 1945 and subsequently took charge of the industrial hygiene research laboratories of ICI Ltd. at Welwyn Garden City, retired recently. All new compounds produced by the company are investigated for toxicity at these laboratories before they are put into production. Dr. Goldblatt is now an adviser to the Medical Research Council on certain aspects of industrial medicine.

● MR. R. A. HAMILTON, who has been appointed a director of the Billingham division of ICI Ltd., will remain visiting director of central agricultural control. Mr. Hamilton graduated at Queen's University, Belfast, in 1932, studied at Cambridge in the following year and then at the Imperial College of Tropical Agriculture, Trinidad. For six years he was on the staff of the Ulster Ministry of Agriculture.

● PROFESSOR RALPH ALEXANDER RAPHAEL has been appointed to fill the regius chair of chemistry at the University of Glasgow where he held a lectureship during 1949-54. Prof. Raphael graduated from the Imperial College of Science and Technology, London in 1941. In 1943 he obtained the Ph.D. degree. After a period with May and Baker Ltd. the professor returned to Imperial College in 1946 with an ICI fellowship. In 1948, at the age of 27, he was awarded the Meldola Medal. Professor Raphael became first professor of organic chemistry at The Queen's University, Belfast.

● DR. H. B. HENBEST has been appointed to the chair of organic chemistry at The Queen's University, Belfast in succession to Prof. R. A. Raphael. Professor Henbest graduated from Imperial College of Science and Technology, London in 1944. After working with PROFESSOR (then DR.) E. R. H. JONES at the college, in 1948 he joined Professor Jones on the latter's appointment to the chair of chemistry at Manchester, as a lecturer in organic chemistry until 1956. Since last year, Professor Henbest has been in the US and recently was reader in organic chemistry at King's College, London.

● MR. JOHN WILSON, director of research, British Rayon Research Association, Wythenshawe, Manchester, since the formation of the association, is to retire at the end of this year. Before joining BRRA he was director of the British Rubber Producers' Research Association Mr. Wilson is now 67. He will be succeeded by DR. L. A. WISEMAN, deputy-director, who joined the Association towards the end of 1956. Previously he was with the Atomic Weapons Research Establishment at Aldermaston.

L. A. Wiseman

● Exeter University Council have confirmed the appointment of DR. K. E. GREW to be reader in physics (from 1 October). The council has also conferred the title of Emeritus Professor of Chemistry on DR. H. T. S. BRITTON.

● New deputy manager of the GEC atomic energy division at Erith, Kent, is DR. K. J. WOOTTON. This appointment which takes effect from the 1 November, is a new one, arising out of the continued expansion of the division's staff and activities under its manager MR. R. N. MILLER.

● The first Professor of Metallurgy at Oxford University is to be DR. W. HUME-ROTHERY, of Magdalen College. The chair has been endowed by MR. ISAAC WOLFSON, chairman of Great Universal Stores. Dr. Hume-Rothery is the present George Kelley reader in metallurgy at Oxford.

● MR. K. H. ROWLAND who has been appointed vice-president production, of Union Carbide Chemicals Co., has been the company's works manager.

COTTON RESEARCH IS MAIN US WEAPON AGAINST SYNTHETICS

MAIN weapon of the cotton producers and processors of the US in their fight against competition from man-made fibres is research. This was stated by Dr. Michael Lock of the British Rayon Research Association, Heald Green, Wythenshawe, Manchester, who has just returned from a 15-month visit to Canada and the US.

Dr. M. Lock who has just returned from North America

Dr. Lock, whose research at BRRA is concerned with the oxidative degradation of cellulose, a topic of particular interest to the rayon industry, said that cotton utilisation research at both the Southern Regional Research Laboratory, New Orleans, and the Institute of Textile Technology, at Charlottesville, Virginia, centred on chemical treatments to modify the cellulose of cotton, i.e. on new durable finishes, aimed at improving the competitive position of cotton, in relation to man-made fibres.

While in Canada, Dr. Lock worked with Professor J. N. K. Jones, in the department of chemistry, Queen's University, Kingston, Ont., on the applications of radioactive techniques to cellulose and polysaccharide chemistry.

Dr. Lock delivered formal papers on the photo-tendering of cellulose at the Canadian High Polymer Forum, Sarnia, Ont., in November 1956, and at the American Chemical Society's meeting, Miami, Florida, in April 1957.

Fisons Closing Scottish Plants

PRODUCTION at the Berwick and Burntisland plants of Fisons Ltd. is being discontinued. The Berwick closing ends a run of 101 years of sulphuric acid production, used mainly in the form of powder fertiliser. It is reported that the increasing demand for granular fertilisers has caused this decision.

The Burntisland plant is being closed because it is old and there have been some complaints from local residents about gaseous effluents.

BoT Considers Exemptions from KID

The Board of Trade are considering the renewal for the period 19 February, 1958 to 18 August, 1958, of the exemptions from Key Industry Duty set out in the Safeguarding of Industries (Exemption) Orders Nos. 6, 8, 9 and 11, and in any further Exemption Order which HM Treasury may make before 18 February 1958, under section 10(5) of the Finance Act, 1926, as amended by subsequent enactments.

Lists of the articles—mainly chemicals—exempted from Key Industry Duty until 18 February 1958 by the above-named orders were published in Statutory Instruments 1957, Nos. 1957, 1640, 1810 and 1948 and will be found in the *Board of Trade Journal* for 16 August, 20 September, 25 October and 15 November, 1957.

East Anglian Towns Use Gas from Oil

TWO TOWNS in East Anglia have become the first in the UK to have a gas supply entirely produced from oil, instead of coal. They are Thetford, Norfolk, whose population of 4,447 will be more than doubled under a London County Council 'overspill' plan, and Brandon, Suffolk, six miles away.

Because the towns are in the centre of a sparsely populated area, some distance from any gas producing station, it was uneconomic to include them in Britain's growing system of gas grids, so the Eastern Gas Board, faced with the need to replace their 26-year-old plant at Thetford, decided to install a Humphreys and Glasgow catalytic oil gas plant.

This plant, which has just commenced operation, converts heavy oil into gas. It was claimed to be cheaper to install than new carbonising plant, and is expected to produce gas several pence per therm cheaper than the old plant. It can be controlled by one man. The plant is in two units, each with a capacity of 300,000 cubic feet of gas per day.

In Parliament

Use of Carbon Dioxide in the Slaughterhouse

Scientists have produced a humane method of rendering animals unconscious, alternative to stunning, stated Mr. D. Heathcoat Amory, Minister of Agriculture, Fisheries and Food, during a second reading last week of the Slaughterhouse Bill. He added that this method, consisting of anaesthetising animals with carbon dioxide, was already in use abroad on pigs.

The process had been investigated with great care and it was thought to be a good one if properly controlled.

Scientists in Paymaster General's Office

Asked how many scientists were now employed in his department and what was his present expenditure on scientific research, Mr. Reginald Maudling, Paymaster General, said the staff numbered 162 and that expenditure in the current financial year was estimated at about £1,045,000.

Redundancy at Courtaulds-Celanese

Answering a question in the House on 20 November, concerning redundancies at the Spondon works of Courtaulds-British Celanese, Mr. Iain Macleod, Minister of Labour, said that he had looked at the position of the senior staff, chemists, engineers and administration staff.

He thought his technical and scientific register might be able to help. Only 26 had applied so far.

Speaking of other workers, Mr. Macleod said that the company had given his officers full facilities to register redundant workers in advance of discharge. Over 1,400 had left the company since September and the majority of the 107 still registered as unemployed were being considered by other firms who had notified vacancies.

Market Reports

ACTIVE CALL FOR BASIC SLAG

LONDON There has been little of fresh interest to report on the chemicals market during the past week. Contract deliveries have been taken up regularly by the main industrial consumers while the volume of new business has again been no more than average for the season. Fertiliser demand has been moderate but an active enquiry for basic slag has been reported. Export trade is keeping up well despite keen competition.

The price position is unaltered except for the non-ferrous metal compounds. Zinc oxides are dearer but red lead and white lead have lost the advance reported last week, and as from 20 November the basic prices for these are £113 and £122 15s per ton respectively, with litharge quoted at £115 per ton.

So far as the coal-tar products are concerned, the movement in the aggregate remains good although the market is without feature.

MANCHESTER Traders on the Manchester chemical market during the past week have handled a fairly steady flow of delivery specifications for the soda compounds and a wide range of other heavy chemicals against contracts, but fresh bookings on home consumption account have been somewhat quieter. Oversea business, however, is keeping up reasonably well in spite of keen competition from foreign producers. The firm undertone of the market has been maintained in virtually all sections. On the whole, a fair demand is reported for fertiliser materials, with a fairly steady absorption also of most of the light and heavy tar products.

GLASGOW Favourable market conditions prevailed for most of the past week in the Scottish market. In some sections, however, there was a slight falling off, but in the majority demands were well maintained, both in the range of current and forward requirements. Prices on the whole have remained firm.

The overseas market continues at a good level, while agricultural demands remain fairly steady with emphasis on forward bookings.

Commercial News

Glaxo Report Almost 25 per cent Increase In Exports

CONSOLIDATED turnover of Glaxo Laboratories Ltd., and subsidiaries rose by 23 per cent in the year to 30 June, 1957, an increase approximately double that achieved in 1955-56. A notable feature of the past year's trading is the rise in the value of direct exports from the parent company to overseas markets. In 1955-56 export sales remained virtually stationary in value, although they increased in volume; in 1956-57, they rose by almost one quarter both in value and volume.

In the home market, sales which now represent about one-third of the group's consolidated turnover, increased in all sectors.

Sales by subsidiary companies this year account for a substantial part of Glaxo's world-wide increase in turnover, and there has been a corresponding increase in the net profit earned by these companies.

New subsidiary companies have been established in Ceylon and Colombia since export sales in these territories had reached a point at which local investment appeared to be desirable in the light of general market conditions and prospects. Factories are now being built in both countries and are expected to be in production early in 1958.

In his report, Sir Harry Jephcott, the chairman, remarks that the level of production costs achieved enabled business to be secured on a profitable basis even in the most competitive markets. He warns that it is possible that even greater efforts will be needed to prevent prices from rising if sales expansion is to continue. Also—'a large and costly research programme is the price we must pay for survival in the highly-competitive industry in which we operate.' Planned expenditures upon research and development are described as 'larger than ever before.' Further laboratories will be provided. Plans for these however, are not yet at a stage that makes it possible to estimate the capital expenditure involved, but 'it will be considerable.'

Sir Harry notes that far-reaching changes in the economy of Western Europe and of the Commonwealth are in prospect over the coming decade, these arising mainly from the ratification of the European common market treaty. He states that although it is realised that serious consequences could follow the abandonment of the measure of protection against European imports enjoyed for many years by the UK pharmaceutical industry, Glaxo have lent their support to the Government's proposal to negotiate with the common market countries and others for the establishment of a European free trade area.

Group trading profits have risen from £2,902,692 to £3,889,750. Net taxed balance is £1,837,629 against £1,665,428. Outstanding commitments are estimated at £590,000 (£418,000). Group fixed assets, at cost or valuation increased from £10,479,209 to £11,358,962, the net figure, after depreciation, being £6,902,980 (£6,617,282).

Dividend distributed for the year ended 30 June last is 12½ per cent against 9½ per cent (equivalent).

International Nickel Co.

Earnings of the International Nickel Co. of Canada during the first nine months of this year were (US) $6.57 million lower than the corresponding record period of 1956, totalling $66.02 million ($72.59 million in 1956).

In the interim report given by Dr. J. F. Thompson, chairman and Mr. Henry S. Wingate, president, it is stated that reasons for the decline were reduced copper prices, increasing operating costs, the strike at the Huntington (West Virginia) plant and reduced deliveries of platinum metals. Offsetting the reductions to some extent, however, were the higher prices for nickel and mill products.

Third quarter earnings for this year at $20.4 million compare with $20.8 million for the corresponding period last year. Net sales for the nine months are valued at $330.33 million compared with $325.58 million in the same period in 1956.

Because of development of the Manitoba project and expansion of facilities in the Sudbury district, capital expenditures have increased to $30.92 million compared with $16.16 million in the first nine months of 1956.

In a letter accompanying the interim report to shareholders, Dr. Thompson refers to the acquisition by Inco's oldest affiliate, Henry Wiggin and Co. Ltd., of the plant at Hereford, England, for the manufacture of Wiggin specialised nickel alloy products, including the high temperature Nimonic nickel-chromium alloys. Dr. Thompson describes the Hereford plant as 'one of the most modern of its type in the world'. Plant additions were already being built to meet the growing demand for Wiggin specialised nickel alloy products by such industries as the chemical, electronic and atomic energy. Acquisition of the Hereford plant marks another step in planning for future production sales and distribution programmes.

National Chemical Products

In his annual report as chairman of the National Chemical Products, Germiston, Johannesburg, Mr. J. L. Irvin, pointed out that in the past year the combined profits of the company and its subsidiaries, before providing for taxation, totalled £305,130, an increase of £78,390. This was the result of an all-round improvement in the profits of the parent company and its two subsidiaries, Umgeni Distillers, Durban, and Poly-resin Products, East London. The company also received valuable technical assistance from The Distillers Co., who have a financial interest in National Chemical Products. The ordinary dividend was increased from 10 per cent to 12½ per cent.

Mr. Irvin said that the Poly-resin Products had the only factory in South Africa devoted entirely to the production of synthetic resins. Competition, however, remained intense and the company had applied to the Board of Trade and Industries for protection. Poly-resin had begun the production of polyester resins. The company had, in conjunction with the Leather Industries Research Institute, developed a range of resins suited for the impregnation of cloth for use in footwear.

National Chemical Products are widening their operations by the formation of a development department to investigate possibilities of making new products. It is also devoting attention to export markets, particularly on the Continent of Africa and the Far East. In the past two years export sales have doubled and now amount to 10 per cent of the company's turnover.

Midland Tar

Group profits, before depreciation, net interest charges and tax, of Midland Tar Distillers Ltd., increased by nearly £92,000—from £642,226 to £734,093. Much of this increase has been offset, however, by heavier tax and depreciation. The net balance at £220,896 is up by £15,000 compared with the preceding year's results.

Dividend on the £1½ million ordinary capital for the year to 30 June 1957, is 10 per cent, the same as for each of the three preceding years.

Kleemann Bid for Erinoid

On behalf of O. and M. Kleemann, plastics manufacturers, Singer and Friedlander are making an offer for the preference and ordinary stock of Erinoid.

The terms proposed are: for every four £1 4½ per cent preference stock units of Erinoid, £1 in cash and three Kleemann 6 per cent £1 preference shares. For every four 5s Erinoid ordinary, 16s nominal of seven per cent first debenture stock 1978-82 and five 1s ordinary in Kleemann. Erinoid ordinary stockholders will be able to sell the debenture to Singer and Friedlander at £98½ per cent, free of expenses.

Both Erinoid and Kleemann have trading agreements with Shell Chemical.

P. Brotherhood Ltd.

In addition to the flow of orders for their normal products such as steam and internal combustion engines, steam turbines, compressors, refrigerating and industrial filtering machinery, Peter Brotherhood Ltd. have recently received large contracts for high pressure air compressors for the chemical industry and for machinery for the manufacture of synthetic fibres and plastics. This was reported by the company's chairman at the annual general meeting.

Gross trading profit before taxation

shows an increase from £299,908 to £375,778. Taxation on this sum takes £211,000 leaving a net profit for the year of £164,778. Final dividend for the year is 15 per cent, making a total of 20 per cent, less tax.

Unilever Ltd.

Interim dividends for 1957 announced by Unilever Ltd., and Unilever N.V. are 6 per cent and 5½ per cent respectively. Both payments are the same as for a year ago. Final dividends for 1956 were 11½ per cent and 10½ per cent giving totals of 17½ per cent and 15½ per cent respectively.

NEW COMPANIES

BIOTICS LTD. Cap. £100. Manufacturers of and dealers in artificial and natural fertilisers, etc. Directors: M. I. Evans, M. W. Wood. Reg. office: 44/45 High Street, Guildford.

CHEMICAL BUILDING PRODUCTS (MANUFACTURING) LTD. Reg. 30 October. Capital £1,000. Directors: R. Lerner, R. T. D. Stoneham and L. Grahame. Solicitors: Stoneham and Sons, 108a Cannon Street, London EC4.

MICEX LTD. Cap. £100. Vermicides, insecticides, etc., manufacturers. Directors: T. S. Oliver, R. A. Oliver and R. N. Oliver. Reg. office: 68 Andover Road, London N7.

NOLAN COLLINGS LTD. Cap. £100. Insecticides, fungicides, etc., manufacturers. Directors: Nolan Collings and Mrs. R. Collings. Reg. office: 150 Orchard Way, Shirley, Croydon, Surrey.

INCREASES OF CAPITAL

ROUSSEL LABORATORIES LTD., 847 Harrow Road, London NW10. Increased by £100,000, beyond the registered capital of £100,000.

T. SAVILLE WHITTLE (EXPORT) LTD., exporters of heavy drugs, chemicals and machinery, etc., 19 Lloyd Street, Albert Square, Manchester 2. Increased by £15,000 beyond the registered capital of £10,000.

CHANGES OF NAME

BY-PRODUCTS AND RESIDUALS LTD., 97/9 Park Street, London W1, have changed their name to Drayton Research Ltd.

DEME PRODUCTS COMPANY LTD., manufacturing chemists, etc., Augustine House, Austin Friars, London EC2, have changed their name to Pinoya Ltd.

LONDON GAZETTE

Voluntary Winding-up

(A resolution for the voluntary winding-up of a company does not necessarily imply liabilities. Frequently it is for purposes of internal reconstruction and notice is purely formal.)

THE PHARMACO-CHEMICAL PRODUCTS CO. LTD. By special resolution 30 October. Mr. S. W. C. Sprunt, Thames House, Queen Street Place, London EC4, appointed liquidator.

FOR YOUR DIARY

MONDAY 25 NOVEMBER

Royal Institute of Chemistry—Walthamstow; South-west Essex College of Technology, Forest Road E17. 7 p.m. 'The extraction and uses of titanium and zirconium' by J. W. Rodgers.

TUESDAY 26 NOVEMBER

Institution of Chemical Engineers & Physical Society—London; The Royal Institution, 21 Albemarle Street W1. 9.45 a.m. Symposium, 'Recent developments in low temperature gas separation'.

Society for Analytical Chemistry—London, Chemical Society, Burlington House, Piccadilly W1. 6.30 p.m. AGM of physical methods group followed by 'Infra-red spectroscopy and the analyst' by Dr. J. E. Page (retiring chairman).

WEDNESDAY 27 NOVEMBER

Institute of Physics—London; Royal Institution, Albemarle Street W1. 2.30 p.m. Symposium, 'The design of physics research laboratories'.

SCI food group—London; 14 Belgrave Square SW1. 6.15 p.m. 'Some applications of the Karl Fischer reagent to sugar confectionery analysis' by A. G. Sansome and Miss M. J. Phillips, and 'Flour lipid characterisation; chromatographic and other studies' by Dr. N. Fisher, Mrs. M. L. Ritchie and Dr. J. B. M. Coppock.

THURSDAY 28 NOVEMBER

Fertiliser Society—London; Geological Society, Burlington House, Piccadilly W1. 2.30 p.m. 'Developments in granulation techniques' by A. T. Brook.

RIC & SAC—Salisbury; Cathedral Hotel. 7.45 p.m. 'Current practice in chemical pathology' by I. MacIntyre.

FRIDAY 29 NOVEMBER

Society of Cosmetic Chemists—London; Royal Society of Arts, John Adam Street WC2. 7.30 p.m. 'Chemistry and biochemistry of sebum' by Dr. V. R. Wheatley.

SATURDAY 30 NOVEMBER

Royal Society—London; Burlington House, Piccadilly W1. 2.30 p.m. Anniversary meeting.

Chemical Stocks and Shares

MARKETS LOOK TO THE FUTURE

MARKETS over the last few days have been looking to the future rather than the present, and have generally rallied from their recent low levels. The reduced American and Canadian interest rates appear to indicate a general slacking in interest rates, which in turn might well be the signal for a recovery in industrial equities.

Chemical features of interest during the last fortnight included Cooper McDougall, shares of which, after having been 32s 6d reacted to 28s 9d on possible takeover rumours. Glaxo Laboratories showing a rise of 2s 3d to 36s 3d have been firm. Fisons and ICI have gained support at 49s 6d and 38s 4½d respectively.

1957 High	1957 Low		19 Nov.	Change on last two weeks
23/7½	16/4½	Albright & W.	17/4½	+7½d
11/6	10/6	Anchor	11/9	—
1/3	1/–	Ashe	1/–	—
24/6	20/–	Bakelite	22/9	+1/6
7/10½	4/9	Berk	5/–	—
36/–	19/6	Borax	23/6	+2/9
10/9	8/10½	Bt. Chrome	9/3	+3d
13/10½	10/3	Bt. Glues	10/9	+3d
6/4½	4/9	B. I. Plast.	5/–	–1½d
8/6	5/6	Bt. Tar	7/3	+7½d
22/3	17/6	Brothertons	17/9	–9d
35/–	27/3	Bt. Xylonite	30/3XD	+3d
4/4½	3/6	Coalite & Ch.	3/9	+1½d
60/3	45/9	Fisons	49/6	+2/6
43/–	24/–	Glaxo	36/3	+4/–
9/6	7/6	Hardman & H.	7/6	—
34/6	24/1½	Hickson & W.	27/9	–9d
46/6	36/1½	ICI	38/4½	+10½d
4/9	2/7½	Kleemans	3/–	—
22/1½	14/6	Laporte	15/6	+1/–
22/–	15/–	Lawes	15/–	–1/3
19/3	12/4½	Monsanto	13/9	+7½d
15/6	11/–	Reichhold	11/9	+6d
11/9	9/–	Yorkshire Dye	10/–	—

Review of Major and Co.'s position shows that their shares at around 4s should provide a possible worthwhile purchase. This company, registered in 1906, is as much an oil refinery concern as it is a chemical manufacturer. At today's price they offer a good yield and are backed by net assets of 7s 1d which is considerably more than the market price. Although the earlier record is a little erratic, with good management this company has maintained sound progress in the post-war years, and there is also a good cover for the dividend.

Major are also well placed financially for expansion and development, and although a conservative distribution policy may will be adhered to for the time being the shares should well repay tucking away.

Manchester Oil Refinery (Holdings), like Major, are largely concerned with oil refining.

However, the group has been extending its interest in the chemical field of late and the prospects here are particularly encouraging. The shares today are now a much more highly regarded investment than they have been over the last few years.

A secondary consideration, but one that cannot be lightly dismissed, is that the shares could conceivably become the subject of a bid from one of the big oil companies interested in expanding its facilities in this field. At 10s they yield 6.3 on their 12½ per cent dividend.

TRADE NOTES

Benzyl-diphenyl can now be supplied as a further item in the BDH series of stationary phase materials for gas chromatography. The working temperatures recommended by BDH laboratory chemicals division, are from 80° to 150°C.

Hickson's Stabilise Prices

Hickson's Timber Impregnation Co. (G.B.) Ltd., Castleford, Yorkshire, intend to hold the present price of 'Tanalith' wood preservative for a further 12 months. The decision was made in an attempt to help stabilise prices despite the fact that costs are rising.

Lower Prices for Calgon

A price reduction of 7s 9d per 100 lb. in the prices of Calgon grades T, B and L has been announced by Albright and Wilson (Mfg.) Ltd. The reduction has been made possible by the use of multiple polythene-coated paper sacks as an outer packing and applies to lots of 100 lb. and over. The 25 lb. open mesh cotton bags used for making up Calgon into concentrated stock solutions are still retained.

Santovar A

Monsanto Chemicals Ltd. announce that they are now producing in the UK Santovar A, an anti-oxidant for unvulcanised rubber. In the past Santovar A has been available only from the US. It is claimed to be non-staining, and its main use is in the manufacture of adhesive plasters, insulating tapes and other pressure-sensitive tapes.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London WC2, price 3s. 3d. including postage; annual subscription £8.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period

AMENDED SPECIFICATIONS

On sale 23 December or as soon as possible thereafter

Anti-histaminic compounds. Schering Corp. **685 696**

Thermoplastic styrene-type resinous polymer compositions. American Cyanamid Co. **760 374**

Calcium carbide and a shaft furnace for use in such manufacture. Stamicarbon N.V. **772 697**

ACCEPTANCES

Open to public inspection on 16 December

Manufacture of titanium. Imperial Chemical Industries Ltd. **788 308**

Preparation of piperazine. Bots Pure Drug Co. Ltd. **788 121**

Derivatives of naphthalene. Wellcome Foundation Ltd. **788 122 788 196 788 082**

Manufacture of titanium. Imperial Chemical Industries Ltd. **788 309**

Epoxy derivatives. Union Carbide Corporation. **788 123**

Production of monosodium glutamate. International Minerals & Chemical Corp. **788 334**

Production of optically active glutamic acid. Pfizer & Co., Inc., C. **788 335**

Quaternary salts of piperidyl esters. Schering Corp. **788 126**

Method and apparatus for deodorising or disinfecting the atmosphere. Calmic Ltd. **788 258**

Condensation products from aromatic hydrocarbon derivatives and carbohydrate-like materials. Universal Oil Products Co. **788 200**

Apparatus for treating pulp with liquid. Hercules Powder Co. **788 341**

Lubricating oil compositions. Esso Standard Soc. Anon. Francaise. **788 129**

Benz (c) acridine compounds and methods for obtaining same. Parke Davis & Co. **788 130 788 264**

Carotenoid compounds and a process for the manufacture and conversion thereof. Hoffmann-La Roche & Co., AG., F. **788 266**

Water softener. Roberts, V. F., and Roberts, V. M. **788 205**

Substituted tetrahydronaphthalenes. Givaudan & Cie Soc. Anon., L. **788 132**

Method and apparatus for shaping plastic foams. Dow Chemical Co. **788 133**

Photographic silver halide emulsions. Du Pont de Nemours & Co., E. I. **788 343**

Purification of N, N^1-bis-(dehydroabietyl) alkylene diamine penicillin. Abbott Laboratories. **788 135**

N-aminoalkyl substituted 6, 8-dimethyl-5- or 7-halogeno-1, 2, 3, 4-tetrahydroquinones. Farbenfabriken Bayer AG. [Addition to 758 570.] **788 347**

Synthesis of 1-bromo-4-chlorobutane. Soc. L'Air Liquide, Co. Anon. pour L'Etude et L'Exploitation des Procédés G. Claude. **788 349**

Manufacture of monoalkyl- and monocycloalkyl-aminoalkyl esters. Abbott Laboratories. **788 137**

Production of phthalic acids. California Research Corp. **788 212**

Production of glycidal ethers of polyhydric phenols. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **788 350**

Purification of phthalic acids. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **788 276**

4-substituted-pyrazole derivatives and a process for the manufacture and conversion thereof. Hoffmann-La Roche & Co., AG., F. **788 140**

Making trichlorophenol mixtures which are rich in the 2, 4, 5-isomer. Dow Chemical Co. **788 141**

Compositions for controlling viruses in plants and seeds. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. [Addition to 777 507.] **788 092**

Solid siliceous materials of high surface area and method of making same. Du Pont de Nemours & Co., E. I. [Divided out of 788 151.] **788 152**

Manufacture of α-phenyl-glycerol ethers. Farbenfabriken Bayer AG. **788 278**

Manufacture of polyene compounds. Hoffmann-La Roche & Co., AG., F. **788 220**

Acetoacetate and a process for the manufacture thereof. Hoffmann-La Roche & Co., AG., F. [Divided out of 788 301.] **788 303**

Apparatus for separating and purifying condensation products. Perfogit Soc. per Azioni. [Divided out of 788 297.] **788 298**

Method and apparatus for handling finely divided solids. Esso Research & Engineering Co. [Divided out of 788 293.] **788 294**

Open to public inspection on 2 January

Apparatus for mixing two liquids together in predetermined quantities. Mountford, L. A., and Mountford, I. J. **788 507**

Method and means for comparing the densities of two fluids. National Research Development Corp. **788 392**

Heat-conduction manometers. Heraeus Ges., W. C. **788 538**

Manufacture of pyridazone compounds. Ciba Ltd. **788 393**

Production of Werner type chromium-III-compounds containing inorganic acid radicals and organic carboxylic acid radicals, and the compounds so produced. Svenska Oljeslageri Aktiebolaget. **788 539**

3, 4-Epoxycyclohexane-carboxylic acids and esters thereof. Union Carbide Corp. **788 541**

Carbonisation of coal. Kruppa, W. J., and Rinckhoff, J. B. **788 446**

Diuretic compositions. Imperial Chemical Industries Ltd. **788 447**

Preparation of resinous condensation products of alkenylphenols and aldehydes. Pittsburgh Plate Glass Co. **788 397**

Vacuum insulated assemblies. British Oxygen Co. Ltd. **788 358**

Feed-control system in distillation-apparatus. Child, W. A. T. L. **788 398**

Grease manufacture. Socony Mobil Oil Co., Inc. **788 510**

Apparatus for heat treatment of thermoplastic or thermo-setting yarn. Klinger Manufacturing Co. Ltd., Scragg & Sons Ltd., E. Gilchrist, R. S., Scragg, E. P., and Mattingly, D. A. E. **788 526**

Methods of and apparatus for treating material in combustion. Biro, G. **788 528**

Apparatus for finishing ampoules. Cuxson, Gerrard & Co. Ltd. **788 400**

Solutions of polyalkylene terephthalates. Gevaert Photo-Producten N.V. **788 363**

Epoxides and method of making same. Union Carbide Corp. **788 530**

Diepoxides and process of producing same. Union Carbide Corp. **788 531**

Control of particle size distribution in fluid coking of petroleum oils. Esso Research & Engineering Co. **788 364**

Heat-curable resinous compositions containing glycidyl phenolic ethers and their method of manufacture. Union Carbide Corp. **788 556**

Oxidation of mercaptans to disulphides. Compagnie Francaise de Raffinage. **788 559**

Manufacture of diketene. Hoffmann-La Roche & Co. AG. **788 596**

Stabilisation of phosphosulphurised hydrocarbons. Esso Research & Engineering Co. **788 456**

Gas recovery process. Distillers Co. Ltd. **788 404**

Surface treatment of polyethylene terephthalate structures such as films. Imperial Chemical Industries Ltd. **788 365**

Phenylalkylamines. Chemische Fabrik Promonta Ges. **788 440**

Plastisol compositions. Du Pont de Nemours & Co., E. I. **788 560**

Stabilised sulphur-containing substances. Esso Research & Engineering Co. **788 408**

Preparing flavinadenine dinucleotide and reduced-form thereof. Takeda Pharmaceutical Industries Ltd. **788 561**

Process for preparing foamed resins. Midland Silicones Ltd. **788 598**

Silicone foamed resins. Midland Silicones Ltd. **788 599**

Production of level dyeings on textile fabrics and means therefor. Kalle & Co., AG. **788 369**

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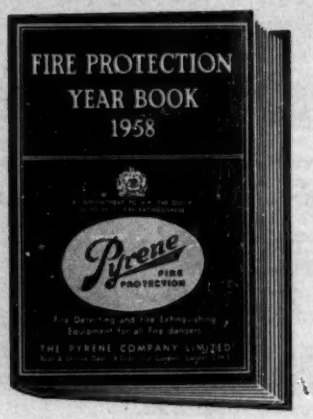

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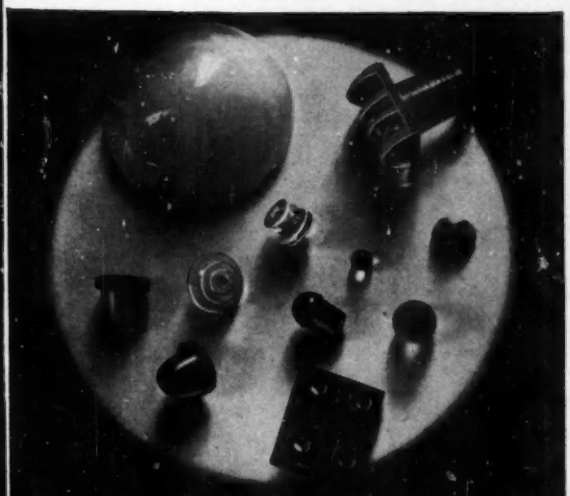

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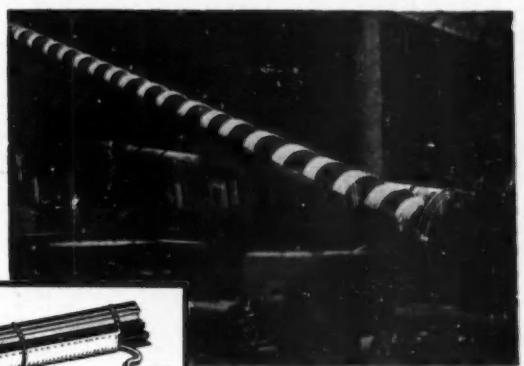

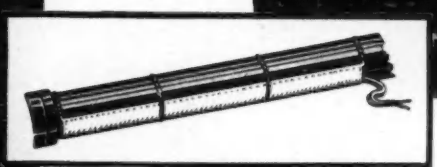

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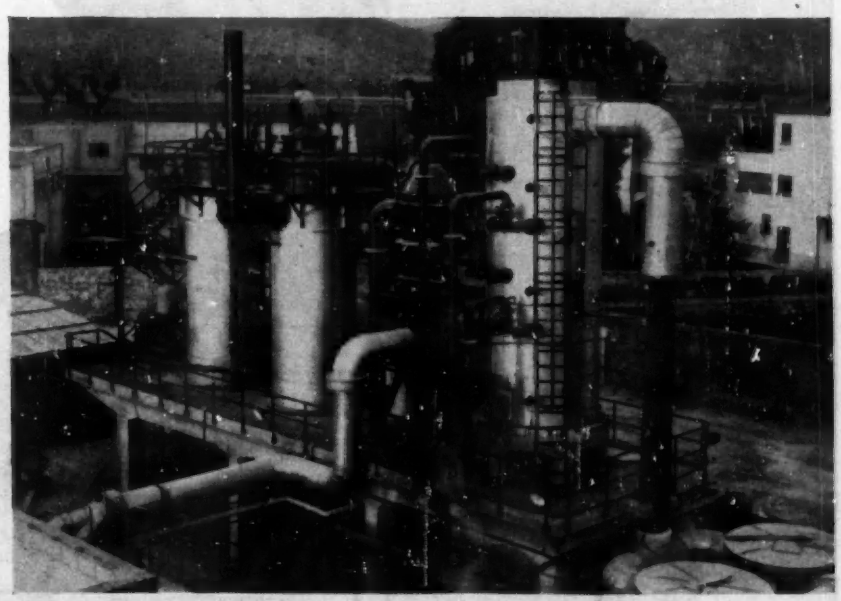

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